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Invitational Symposium

Nursing and Health Outcomes Project

March 15 and 16, 2001 • Toronto, Ontario, Canada

NURSING AND HEALTH OUTCOMES PROJECT

MARCH 15 AND 16, 2001

TORONTO, ONTARIO

CANADA

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Table of Contents

Backgrounder: The Nursing and Health Outcomes Project 1

Introduction 11

Welcome from the Ministry of Health and Long-Term Care 15

The Evolving World of Outcomes 19

Recent Work Relative to 1996 Recommendations 25

- American Nurses Association Study on Nursing-Sensitive Outcomes 28
- The Nursing Staff Mix Outcomes Study 31
- Research Using the Minimum Data Set (MDS) Instruments 37
- Discussion 41

State of Science: A Methodological Review of the Literature on Nursing-Sensitive Outcomes 43

- Discussion 58

Ongoing Issues and Challenges 63

- Capturing Nurses' Work 66
- Implications of Multi-Level Modeling for Nursing Systems Outcomes Research . . 70
- Continuity Across Sectors 74
- Discussion 77

Data and Technology 79

- Architecture of Information Systems 83
- Linking Nursing Data in Ontario 85
- Building on Existing Data: Considerations for Future Development 89

Recommendations for Capturing Nursing Indicators and Health Outcomes in Ontario 95

References 103

Participants 108

Backgrounder:

The Nursing and Health Outcomes Project

What is the Nursing and Health Outcomes Project?

Nurses are the largest contributors to patient care in all sectors of the health care system but you would not know that on the basis of information about nursing recorded on administrative databases. These databases contain information from patient charts that are abstracted after the patients are discharged. They include information about patients themselves such as their age and gender, their diagnoses and medical interventions they have received. There is nothing at all about nurses' contribution to their care. The purpose of The Nursing and Health Outcomes Project is to identify nursing-sensitive patient outcomes and their attendant nursing inputs and processes that could be entered on and abstracted from patients' charts or provided in other formats. This would allow administrators and researchers in the future to describe how different nursing interventions and different numbers and types of nurses (RNs, RPNs) effect patient outcomes. In the longer term, it may be possible to develop a funding formula that is nursing-specific. The project will focus on acute care, long-term care and community care (home care).

BACKGROUND TO THIS PROJECT

In January 1999 the Nursing Task Force released its report, *Good Nursing, Good Health: An Investment for the 21st Century*. This report included a series of recommendations for changes to nursing in response to health care reform and for changes to the system to insure the public has access to high quality nursing services. One of the recommendations focused on the need for a funding method for nursing which is responsive to the needs of the health care consumer. This recommendation specified that the funding formula should be based on performance standards that promote high quality patient outcomes, and on health information systems that provide comprehensive and reliable data on nursing services. After a series of consultations with experts in outcomes and funding methodologies, a framework for The Nursing and Health Outcomes Project was developed. This framework identified that as a first step in meeting the ultimate objective of a funding formula, the current databases must be analyzed for their nursing-relevant content, and nurse-sensitive patient outcomes identified along with the structures and processes (both health system and nursing specific) that are associated with them.

Who is on the Nursing and Health Outcomes Project Committees

There are two teams working on this project. The Expert Panel on Outcomes (EPO) consists of researchers with expertise in outcomes and/or databases, and its responsibility is to identify health outcomes that are sensitive to nursing practice and recommend methods of assessment and database locations. The Outreach and Feasibility on Outcomes Committee (OFOC) consists of representatives from nursing organizations in Ontario, e.g., The Registered Nurses Association of Ontario (RNAO), The Registered Practical Nurses Association of Ontario (RPNAO), the College of Nurses of Ontario (CNO), the Ontario Nurses Association (ONA) and nursing representatives from the acute care, long-term care and community care sector. Its responsibility is to assess and provide feedback on the feasibility of the outcomes identified by the Expert Panel and to keep their constituent nursing communities informed about the progress of the project. As well, members of this latter committee will serve as contacts for nurses who wish to discuss the project.

What are Nursing-Sensitive Outcomes?

Johnson and Maas (1998) define a nursing outcome as "a variable concept representing a patient or family caregiver state, behaviour, or perception that is measurable along a continuum and responsive to nursing interventions." Research supports the influence of nurses on patient outcomes; however, it is not always clear what the relationship is between nursing inputs and nursing practice processes and patient outcomes (Pierce, 1997). It is not always easy to measure outcomes or the associated inputs and processes or know when they should be measured in the course of a patient's health care episode.

Some of the Challenges

As Irvine, Sidani & McGillis Hall (1998) have noted, "Identifying outcomes for which individual nurses can be held accountable is a challenge. This challenge stems from accumulated evidence suggesting outcomes are multifaceted and reflective of what preceded them. Outcomes are affected not only by the care provided, but also by the factors related to the patient, to the interpersonal aspects of care, and to the setting or environment in which care is provided."

Data availability, i.e., the information about inputs, processes and outcomes, presents a challenge as different recording systems exist within the health care system. Hospitals, long-term care facilities and community organizations record and report a variety of data elements on a regular basis, however, the data elements recorded are often not similar across sectors and, at times, are used inconsistently, rather than in a

uniform, systematic manner. Current databases do not capture the minimum data elements that have been researched and agreed upon by the nursing profession as reflective of good nursing practice. In order to have confidence in relationships that may be found between various inputs and outcomes, it is essential that valid and reliable data that are reflective of nursing practice be included. Without this, the contribution of nurses cannot be demonstrated nor will any associations that are found be accepted by nurses as reflecting their experience or contribution.

Linking with other Initiatives

While the science of outcomes is still young, there are several initiatives occurring in this area. For example, the American Nurses Association is examining the development of a national database to quantify the role of nursing interventions in patient outcomes. Pilot studies have been conducted in seven states and they are now working on a design for a national database. The Nursing and Health Outcomes Project has been in contact with two projects in the United States that are exploring how to capture nurse-sensitive outcomes on databases.

The Canadian Nurses Association (CNA) recently released a discussion paper entitled Collecting Data to Reflect Nursing Impact (April 2000). In this paper the CNA identifies the need for consistent data collection in nursing to aggregate and compare data. The CNA supports linking with the International Classification of Nursing Practice (ICNP®) project which is involved in the development of a universal, generic and comprehensive foundational classification system for nursing. The CNA recognized the following components as essential to a database to describe nursing practice: client status, nursing intervention and client outcome. By linking with the CNA, and ultimately ICNP, nurses can begin to describe and compare nursing practice across settings, client populations, geographical areas and time.

The Canadian Institute for Health Information (CIHI) is currently updating their classification systems to meet the evolving needs of their users. These changes offer opportunities to formalize a data collection process for nursing within the larger health care information system. The CNA is collaborating with CIHI and nursing experts to build support for a national classification system for nursing.

Progress to Date

A literature review on outcomes with a specific focus on nurse-sensitive outcomes was conducted. A key issue for this project is the nature of the outcomes we want to define and against which to measure performance. Outcomes are affected by a variety of inputs and environmental factors. Provider characteristics, system characteristics such

as how care is organized and consumer/patient behaviours are all elements contributing to outcomes that must be understood. There is evidence that nurses influence the following patient outcomes: morbidity, mortality, health status, self-care ability, symptom control and patient satisfaction with care, and adverse events such as infection rates, falls, skin breakdown and nosocomial infections. As well, nurses' job satisfaction is reported in several studies to be indirectly linked to patient satisfaction, i.e., when nurses have greater job satisfaction, patients report higher levels of satisfaction with care.

After reviewing the literature on nurse-sensitive outcomes and examining the issues and complexities in capturing nurse-sensitive outcomes on databases a decision was made to proceed with a Request for Proposal (RFP) to provide an in-depth analysis of specific nurse-sensitive outcomes and where they might be captured on existing databases. This information is not currently available. This RFP will provide an analysis of the research and instruments used to assess the following outcomes: functional status, symptom management, self-care, patient satisfaction with nursing care and nurse job satisfaction. The RFP will also provide recommendations regarding the appropriateness and feasibility of incorporating these outcomes into administrative databases in the three health sectors and measures that should be used to capture these outcomes, as well as the relevant structures and processes associated with these outcomes. The RFP was posted in June 2000 and was subsequently awarded to Drs. Diane Irvine Doran, Principal Investigator, Souraya Sidani, Linda McGillis Hall, Judy Watt-Watson, and Claire Mallette from the Faculty of Nursing at the University of Toronto, and Dr. Heather Laschinger from the School of Nursing at the University of Western Ontario.

The Nursing and Health Outcomes Project is also examining the relationship between adverse occurrences in the health care system and nursing practice. The release in the United States of the report by the Institute of Medicine entitled *To Err is Human: Building a Safer Health System* (November 1999) highlights the need to examine patient safety in our health care system. As one of the largest health care providers, we need to understand nursing's role in this area.

An assumption has been made that information on nursing inputs and nurse-sensitive outcomes would be housed on existing databases rather than building new databases. To meet this requirement the project requires an inventory of administrative databases and other databases such as the College of Nurses registry data and the National Population Health Survey data, including what information they hold and what their capacity is for including additional information. The Nursing Effectiveness, Utilization and Outcomes Research Unit (NEUORU) at the Faculty of Nursing,

University of Toronto developed an inventory of relevant databases and identified all the nurse-sensitive variables incorporated in these databases.

At a 2 day meeting with the EPO in February, 2001 the EPO reviewed the work of the RFP and made recommendations about where further work is required prior to piloting outcomes and which outcomes we could proceed with in pilot studies. These recommendations were then reviewed by the OFOC. At the Invitational Symposium in March 2001 experts from across North America provided consultation regarding the recommendations, as well as, feedback about the challenges that we may face as we move forward on embedding nurse-sensitive outcomes on databases.

Goals for Phase 1

At the end of Phase 1 The Nursing and Health Outcomes Project plans to provide:

- An inventory of existing nursing inputs, nursing interventions and nurse-sensitive outcomes in all three sectors.
- The recommended outcomes for each sector.
- The recommended measures to capture these outcomes.
- Databases on which these outcomes could be located or can be found.
- Recommendations about when the data should be recorded, e.g., annually in long term care or on patient discharge in acute care.
- A framework for pilot projects.

Future plans

Phase 2 will involve conducting pilot studies in the acute care, long-term care and community care sectors to assess the actual feasibility of capturing the data and to cost the process of conducting additional assessments, and recording and abstracting these new data elements. These pilots will assist in the testing of a template of key nursing-sensitive elements comparable among, or common to, all sectors.

Why is this Project Important for Nursing?

The Ministry of Health and Long-Term Care is committed to The Nursing and Health Outcomes Project because the results of this project will contribute to improved accountability in the health care system. Furthermore, it will begin to fill the gap in information about what nurses contribute to patient care. This project has the potential to serve as a model for the subsequent inclusion on administrative databases

of the contributions of other health care providers to patient outcomes. Report cards and health care atlases are part of the health care scene in 2000. Nursing is absent from this scene. While individual patients can describe how nurses contributed to their care, the overall contribution that nurses make cannot be assessed. If we want to capture resources necessary to not only maintain, but enhance our contribution, we have to be able to demonstrate what we do in the language and methods of 2000.

References

1. Irvine, D., Sidani, S., & McGillis Hall, L. (1998). Linking Outcomes to Nurses' Roles in Health Care. *Nursing Economic$*, 16 (2), 58-64.

2. Johnson, M. & Maas, M. (1998). Nursing Outcomes Classification. *Journal of Nursing Quality Care*, 12 (5), 9-20.

3. Pierce, S. F. (1997). Nurse-sensitive health care outcomes in acute care settings: an integrative analysis of the literature. *Journal of Nursing Quality*, 11(4), 60-72.

Nursing and Health Outcomes Project

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Introduction

Dorothy Pringle RN, PhD
Director
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Introduction

The Ontario Ministry of Health and Long-Term Care initiated the Nursing and Health Outcomes Project as one strategy to begin to address the problems of the nursing workforce and the health care system. This project provides the opportunity for nurses to identify nursing inputs and nursing-sensitive patient outcomes that can be routinely assessed by nurses, recorded, abstracted from patients' records, and located on administrative and clinical databases. Questions can then be posed about the relationships between nursing inputs such as staff mix, ratio of nurses to patients, and nursing education and experience, and important indicators of patients' responses to nursing care.

The task of identifying and determining the type and timing of measuring relevant patient outcomes seems straightforward enough – until actual decisions have to be made. The science of patient outcomes is developing rapidly and must be taken into account in the decisions about what outcomes to select. Hence, the Invitational Symposium was held in Toronto in March 2001. The Expert Panel of the Project had worked for over a year to identify what they believed to be appropriate outcomes for acute, community, and long-term care. The symposium provided the opportunity to seek the advice of experts on the outcomes that were being proposed, to examine a variety of issues related to their selection and measurement, and to address other questions that arose in the course of the project.

The objectives of the symposium were:

1. Examine the state of science of outcomes relevant to nursing's contribution to health care
   - the nature of outcomes
   - definition and measurement of outcomes
   - issues in capturing outcomes
2. Advance our understanding of the issues and complexities in capturing nurse-sensitive outcomes on databases
3. Review and advise re: the appropriateness of the proposed nursing relevant outcomes for Ontario and inform future work of the Nursing and Health Outcomes Project.

The symposium met our objectives. The excellent presentations by experts in the field of outcomes provided the opportunity to measure our decisions against this material. We had many opportunities for discussion and the weighing of various options.

These Proceedings provide an excellent overview of the symposium including summaries of the presentation and discussions. They serve as an important milestone in the evolving science of patient outcomes and an excellent reference for future work in this arena.

Peggy White, the Manager of the Nursing and Health Outcomes Project, assisted by our Editor, Barbara Bauer, deserve enormous thanks for quickly producing the Proceedings. As well, cooperation of all the speakers in reviewing their sections and returning the material to Peggy is greatly appreciated.

Dorothy Pringle, Director
Nursing and Health Outcomes Project
July 23, 2001

Welcome

Ministry of Health and Long-Term Care

Kathleen MacMillan
Provincial Chief Nursing Officer

Kathleen M. MacMillan, RN, MA, MSc, PhD (cand.)

Provincial Chief Nursing Officer

Ministry of Health and Long-Term Care, Ontario

Kathleen MacMillan is a graduate of the Toronto East General Hospital School of Nursing, and received her Masters degree in Nursing Science from the University of Toronto. She also holds a Masters degree in Physical Anthropology and is currently a doctoral student at the Institute of Medical Science – both at the University of Toronto. Her doctoral research is directed to investigating people's understanding of consent forms designed to support informed consent to participate in research. She is the author of numerous publications and a frequent guest speaker to varied audiences.

Ms. MacMillan is a past President of the Registered Nurses Association of Ontario (1994-1995). She has held positions within the Ministry of Health as policy advisor to both the Honourable Jim Wilson and the Honourable Elizabeth Witmer, Ministers of Health for Ontario (1996-1999) and as Nursing Coordinator for the Province from 1995-1997. In these roles, she participated in the introduction of legislation to support the role of nurse practitioners in the province, and in achieving nursing education reform.

In her new role as the first Provincial Chief Nursing Officer, Ms. MacMillan will provide senior level policy input to the Ministry of Health, from a nursing perspective. She brings to this role more than thirty years of experience as a nurse in clinical practice, education and health policy, and a passion for her chosen profession.

Welcome
from the Ministry of Health and Long-Term Care

I would like to welcome you all and convey greetings from the current Minister of Health and Long-Term Care, Tony Clement. The Government of Ontario, under the leadership of Elizabeth Witmer, the former Minister of Health and Long-Term Care, created the Nursing Task Force in September 1998, primarily to examine issues around the supply and demand and the recruitment and retention of nurses in all sectors of the province of Ontario. The key issues included the following:

How do we improve patient care through nursing services,

How do we maintain and enhance a strong and continuing base of skilled and knowledgeable nurses,
How do we define a role for nurses in a restructured health care system, and

How do we determine the educational qualifications that nurses need for the future.

The Nursing Task Force report entitled, *Good Nursing, Good Health: An Investment for the 21st Century* (1999), highlighted a series of recommendations directed towards improving the level of access to high quality nursing services and also towards changes in nursing related to health care reform within the province of Ontario. In March 1999, the government accepted all eight of the strategic recommendations, and they are now in the process of being implemented in the province. Funds were directed towards nursing research to understand nursing's role in patient outcomes.

The Nursing and Health Outcomes Project originated in recommendations 5 and 6 of the Nursing Task Force's report where the need for a comprehensive method of funding nursing services was defined. This funding model must be responsive to the health care consumers' needs and be based on performance standards that provide high quality outcomes. Moreover, it must also be based on health information systems that will provide comprehensive and reliable data on nursing services that we require. In addition, it was recommended that information systems be developed to include data on nursing workload and productivity that would support better client outcomes.

While nurses are the largest contributors to patient care across the health care system, there is very little information about nurses and their impact on health outcomes in the existing administrative databases. Therefore in order to develop a funding mechanism, we needed to work backwards first to improving the quality of the data. In Ontario, as in other jurisdictions, employers have made changes in staff mix without fully understanding the impact of the changes on patient outcomes. The Nursing and Health Outcomes Project will help us identify nursing-sensitive patient

outcomes and their attendant nursing inputs that could be entered onto and abstracted from patients' charts or provided in other formats so that we will have better information for future researchers.

This symposium offers us the opportunity to consult on the work that has been done by The Nursing and Health Outcomes Project, pull in experts from disciplines outside of nursing, and provide an opportunity to examine the state of the art of nursing-sensitive patient outcomes and where we need to go from here. Our hope is that we will be able to use this information to guide provincial policy and decision making related to nursing outcomes.

The Evolving World of Outcomes

PAMELA MITCHELL, PhD, RN

Pamela Mitchell, PhD, RN

Dr. Pamela H. Mitchell is currently Associate Dean for Research, Professor of Biobehavioral Nursing and Health Systems, and holds the Elizabeth S. Soule Distinguished Professorship of Health Promotion at the University of Washington School of Nursing. She is also Adjunct Professor of Health Services, School of Public Health and Community Medicine at the University of Washington.

She received a BSN from the University of Washington, an MS with a focus on medical-surgical clinical specialization from the University of California, San Francisco, and a Ph.D. in Health Care Systems Ecology from the University of Washington. She has been engaged in advanced nursing practice, clinical and systems research and nursing education for over 30 years. Her practice and research are in neuroscience and critical care nursing, with expansion into studying care delivery systems as they impact clinical outcomes. These works are currently funded by the National Institute of Nursing and the National Institute of Heart, Lung and Blood. She is also project leader for the six Health Science Schools and the Information School in developing Health Science Interprofessional Partnerships in Clinical Education at the University of Washington. She is a member of the American Academy of Nursing Expert Panel on Quality Care, the Steering Committees for the Center for Cost and Outcomes Research, Center for Statistics and the Social Sciences, and the Graduate Program in Biomedical and Health informatics at the University of Washington. Nationally she chairs a Scientific and Technical Review Board for the National Center for Research Resources, and is a member of the Health Care Quality and Effectiveness review group of the Agency for Healthcare Research and Quality.

The Evolving World of Outcomes

In 1996 the American Academy of Nursing, with sponsorship from the Agency for Health Care Policy and Research and a variety of other organizations, developed an invitational conference on outcomes of care delivery. People were brought together from nursing, insurance companies, and health services research to try to understand what some outcomes might be from across the continuum that would capture clinical care and, in particular, nursing care. Up until that point the majority of outcome work had been concerned with specific clinical problems and had not examined care delivery system features or organizational factors. This conference had its origins in the American Academy of Nursing Expert Panel. The panel still exists and is planning to develop future conferences around quality outcomes for nursing care. The goal of this expert panel is to stimulate knowledge about quality of care and outcomes, and to publicize, within nursing, the importance of outcomes research. In planning for this conference, the panel designed the Quality Health Outcomes Model (Mitchell, Ferketich, & Jennings, 1998), which was intended to be a broad conceptual model from which people might understand how to link these concepts together. The purpose of the conference was to identify and clarify outcome indicators that would be sensitive to organizational factors, one of those being the delivery of nursing care. At the time, we were sensitive not to focus solely on the profession of nursing, recognizing that nursing was one of the primary deliverers of care in the context of other care delivery. Our goals were to identify promising indicators for further measurement, development, and incorporation into studies of care delivery systems and to develop research and policy recommendations.

The Quality Health Outcomes Model was based on the fact that if we were going to be looking at indicators sensitive to nursing care, these needed to be outcomes of structures and processes that integrated functional, social, psychological, and physical/physiologic factors, as well as aspects of patient experiences. In 1996 most indicators that were in databases concerned physical or physiological outcomes. All the other factors that were important for nursing care were not there. Today they still are not in databases; however, we are moving in the right direction.

The predominant model that we have used to examine outcomes was, and continues to be, Donabedian's model of structure-processes-outcomes (Donabedian, 1980). Although Donabedian never intended this model to be represented in a linear way, we have tended to interpret it this way. We were looking for another way to represent this model while integrating organizational factors. We began to speculate on the possibility that interventions do not actually affect outcomes. Interventions, whether they be at the individual level or system changes, actually may function by working through the

system – either individual physiological systems, organizations systems, or groups – and through characteristics of the client. That client could be conceived of at a range of aggregate levels. The interventions may, or may not, have a direct effect on outcomes. In health care we have often designed clinical trials as if there is a direct effect from the intervention to the outcome, irrespective of the system.

From this model, five categories of outcomes stem that would capture the integrated aspect of things that would be sensitive to nursing care: achievement of appropriate self-care, demonstration of health-promoting behaviours, health-related quality of life, patient perception of being well cared for, and symptom management to criteria. We also recognized that existing databases contained data on morbidity and mortality and that we should not ignore these. Cost is also an important outcome. At this conference, the presentations were structured around those categories and the presenters were asked the following questions:

If these were viable categories of outcomes from either a theoretical or empirical point of view, would further work be needed in terms of study design and measurement work?

How accessible would data be for these categories?

What were the research policy and practice recommendations?

The proceedings from this conference can be found in *Medical Care Supplement, 35* (11), NS19-NS32.

From a theoretical perspective, we recognized that most of the existing work was primarily empirical and without a theoretical base, and that the presumed causal relationships were not well known. We realized that we needed to get better at using existing primary and secondary datasets to generate the relationships. We must capitalize on natural experiments, as the cost of primary data collection is prohibitive. Moreover, we recognized that work must be done to increase the expertise in methodological issues unique to organizational research.

All five outcome categories looked viable with some work needed. This group recognized appropriate self-care as being the best proxy for what nursing does. Self-care is not captured in existing databases. This conference occurred during the development of the Outcome and Assessment Information Set (OASIS). This is a set of indicators that is mandated for use in the home care sector in the U. S. and must be completed for Medicare reimbursement. OASIS has the potential to capture appropriate self-care and some symptom management outcome categories in the home care sector.

Health promoting behaviours was viewed as an intermediate outcome. In the American Nurses Association's (ANA, 2000) work, health promoting behaviours

appears as a process category in the community indicators project. While the health-related quality of life category subsumes everything, there is a problem with measurement for this concept. Very few studies linked people's perception of their quality of life with organizational care delivery factors. Patient's perception of being cared for is a broader category than patient satisfaction, but it does reflect the need to know if patients felt that they were being well cared for. Since this outcome can be measured in multiple ways, problems arise around a consistent definition and measure across databases. The category of symptom management had measures, but very little linking it with care delivery factors or linking symptom management to clinicians' attempts to change the delivery of care to improve symptom management. While mortality and adverse outcomes are in discharge databases and inform all the current studies about staffing and outcomes, some serious methodological issues concern how to capture adverse events. Costs are captured in existing databases, but there are issues with the quality of the data. Social costs are rarely included, and this is an area where nurse researchers need to focus their work.

MEDLINE offers evidence of an explosive growth in the area of outcomes research. In the published research from 1978 -1989, nothing about outcomes was listed; however, from 1997-2000, there are over 700 citations. The ANA Report Cards for acute care and the community (ANA, 1995, 1996, 1997, & 2000) are important efforts at identifying specific nursing indicators. The Nursing Interventions and Outcomes Classification projects (Johnson & Maas, 1998) are attempting to develop a standardized language for nursing. The big issue remains in demonstrating, first, the sensitivity of outcome indicators to nursing practice and variations in nursing practice and, second, their availability in organizations. The ANA acute care report cards attempted to examine indicators of structure, process, and outcome. The key criteria were: are they clinically relevant, are the data there, how valid and reliable are the existing measures, how relevant were the indicators for nursing practice, and will these data influence nursing practice. The ANA expended considerable time and effort on large literature reviews to answer these questions before choosing indicators that might be used for their projects. The indicators in the ANA Report Card match up to the five indicators that were examined at the 1996 conference (see Figure 1). Dr. Linda Aiken's (Aiken, Smith, & Lake, 1994) landmark study examined mortality in magnet hospitals. This study set the stage for the use of existing databases for research and for capitalizing on natural experiments. Some current studies are also going on in the U.S. with respect to nurse staffing and outcomes. These studies will further illustrate some of the limitations in U. S. databases for the outcomes we are able to study when we are trying to look at multiple, rather than single, institutions.

Figure 1. Comparison of ANA and Quality Health Outcomes Model Indicators

ANA Acute Care Report Card Indicators	Quality Health Outcomes Model Indicators
• Nosocomial infection rate Patient injury rate	• Morbidity/mortality
▪ Patient satisfaction with: • nursing care • pain management • patent education	▪ Perception of being well cared for • Appropriate self-care • Health related quality of life • Health-promoting b ehaviours • Symptom management

Other areas where the Expert Panel hopes that we can begin to work with the broader health care system include such outcome endeavours as the Quality Interagency Coordination Task Force (QUIC), which is an intergovernmental group that is attempting to identify indicators that can be used to look at quality for federal employers. The Institute of Medicine (IOM) has a very large quality component with a series of reports coming out. The IOM is linked with the Agency for Healthcare Research and Quality (ARCH). This organization has been mandated to produce reports on the quality of health care in the U. S. The number of staffing and outcomes database initiatives in the U. S is also growing. QUIC is linking with these other initiatives to identify quality indicators that cut across datasets and across the health care continuum. The IOM initiative shows great promise for influencing what is in databases. The goal of the IOM reports is to create and recommend a system for monitoring processes for the progress of health care in the health care system. The first report is *To Err Is Human: Building a Safer Health System* (IOM, 1999), and the latest is *Crossing the Quality Chasm: A New Health System for the 21st Century* (IOM, 2001). These reports examine system competencies which consist of patient safety, effectiveness of general care, patient centeredness, and timeliness within the context of efficiency and equity. Future work will be influenced by consumer perspectives such as staying healthy, getting better, living with illness and disability, and coping with the end of life.

The ability to get these measures well developed, standardized, and onto databases offers the opportunity to capture the outcomes that are sensitive to nursing care. Although the focus is on what is out there, such as patient safety and clinical outcomes, there is a need to understand the consumer perspective. We need both the consumer perspective and the system perspective. Having both will be our challenge for the future.

Recent Work Relative to 1996 Recommendations

ANA Study on Nursing-sensitive Outcomes

Patricia A. Rowell, PhD, RN

Nursing Staff Mix Outcomes Study

Linda McGillis Hall, RN, PhD
Diane Irvine Doran, RN, PhD

Research Using the MDS Instruments

John P. Hirdes, Ph.D.

Discussion

Patricia A. Rowell, PhD, RN

Patricia Rowell has undergraduate degrees in science (BS) and nursing (BSN), a masters degree in nursing (MSN) with certification as a pediatric nurse practitioner (PNP) and a doctor of philosophy (PhD) in health services research.

Dr. Rowell has a broad range of clinical and academic experiences. She has worked in acute care pediatric, emergency and psychiatric clinical areas, ambulatory pediatrics, public health and home health. In addition, following completion of her doctorate, she worked as a health services researcher at the American Medical Review Research Center (AMRRC) and the Center for Health Affairs, Project HOPE. Currently, Dr. Rowell is a senior policy fellow for the American Nurses Association where her areas of responsibility include policy issues related to quality of health care, women's and children's health and research supervision in the area of quality of care.

Linda McGillis Hall, RN, PhD

Linda McGillis Hall, RN, PhD is an Assistant Professor in the Faculty on Nursing, University of Toronto, and Co-Investigator with the Nursing Effectiveness, Utilization, and Outcomes Research Unit operating out of the University of Toronto and McMaster University. Dr. McGillis Hall completed a Medical Research Council (MRC) Postdoctoral Fellowship with the Department of Health Administration, University of Toronto where she examined the effectiveness of methods used for the costing of nursing resources.

Dr. McGillis Hall's research interests relate to determining the effectiveness of nursing practice within the health care system and the outcomes experienced by registered nurses. She has developed a research program aimed at studying mechanisms for examining different staff mixes in the nursing workforce in Canada and the quality of work life/ work environment for nurses. Linda has presented numerous papers on topics related to staff mix in nursing and nursing work effectiveness. Linda has several publications to her credit related to staff mix models employed in hospitals, and in the broader area of nursing administration science

Diane Irvine Doran, RN, PhD

Diane Irvine Doran, RN, PhD is an Associate Professor in the Faculty of Nursing and Director of the Joint MN/MBA Program between the Faculty of Nursing and Joseph Rotman School of Management. In 1999, Dr. Irvine was a recipient of the Ontario Premiers Research Excellence Award. The foci of her research are health care teams, the evaluation of methods for improving quality in nursing practice, and the design and measurement of nursing sensitive patient outcomes. Dr. Irvine Doran teaches two graduate courses in the Faculty of Nursing: Management of Nursing Service and The Theoretical Basis and Methodology for Quality Improvement in Nursing Services. Dr.

Irvine Doran has published papers on cross-functional teamwork, the outcomes of effective teams, identifying and measuring nursing sensitive outcomes, the evaluation of measures for assessing psycho social outcomes for women with breast cancer, and methods for improving the quality of nursing care. She has presented papers both nationally and internationally on these same topic areas. She has published widely in peer reviewed journals.

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Dr. Hirdes is an Associate Professor, Department of Health Studies and Gerontology at the University of Waterloo. He is also the Director of Research, Canadian Collaborating Centre- inter*RAI* at Providence Centre in Toronto. Dr. Hirdes completed undergraduate training in Health Studies and masters and doctoral degrees in Sociology at the University of Waterloo. In addition to his appointment at UW, he is cross-appointed to Gerontological Studies, McMaster University and the Department of Medicine, University of Toronto. He has conducted applied research in health care for over 15 years, and he is currently the Director of Research, Providence Centre. Dr. Hirdes was a member of the Ontario Gerontology Association Board of Directors from 1986-1992, including a 2-year term as Vice-President. He is also a member of the Canadian Standards Association's (CSA) Strategic Advisory Group on Aging and the Canadian Advisory Committee of the International Organization for Standardization (CAC/ISO) Technical Committee 215 on Health Informatics. He recently received a 5 year Investigator Award from the Canadian Institutes for Health Research to support his research on "Health Informatics for an Aging Society".

Dr. Hirdes currently has about 60 publications in the areas of aging and health. His primary areas of interest are geriatric assessment, mental health, health care and service delivery, health information management, social determinants of health, and quantitative methods. He is co-editor of a book on health care for the elderly in North America, Europe and Japan that was released in Fall 1999.

Dr. Hirdes is a Fellow and Board Member of interRAI, an international consortium of researchers from 20 countries responsible for on-going research and development of the Minimum Data Set (MDS) for long term care, home care, mental health, rehabilitation, palliative care and acute care. He served on the Chronic Care and Rehabilitation Working Group of the Joint Policy and Planning Committee (JPPC - a partnership with the Ontario Ministry of Health and the Ontario Hospital Association) from 1994 to 1996. He is part of the JPPC Psychiatric Working Group and is leading a multinational collaborative effort to develop the RAI-MH, an assessment and case-mix funding system for mental health. Dr. Hirdes is a co-investigator in clinical studies of the MDS series of assessment instruments for nursing homes, chronic and acute hospitals, home care, mental health and rehabilitation across North America, Europe and the Pacific Rim.

American Nurses Association Study on Nursing-Sensitive Outcomes

In 1992 the American Nurses Association (ANA) received reports from nurses expressing concern about the quality of care that they were able to deliver because of the restructuring of acute care facilities in the U. S. As funds became tighter, facilities decided that they needed to save money. Since nursing is one of the largest budgets within these organizations, many of them began to replace registered nurses with less skilled workers who were cheaper. Unlicensed personnel were substituted for registered nurses, and different personnel, for example those in housekeeping, were cross trained to do such patient care as feeding. There were fewer registered staff and, consequently, less supervision of these other workers.

In 1994 ANA directed a multi-faceted initiative to find out what the impact of these changes was on the quality of patient care. Quality care was supposed to become the driving force behind care and the principle upon which organizations would compete. A few things needed to be addressed in planning how to deal with the reduction in the number of registered staff. First, it was recognized that the procedures and services recorded in utilization databases captured only a small portion of the care received by patients. They captured what is paid for, that is, physicians and physical therapies. Nursing was invisible. Rather than quality of care, the focus was on costs and utilization. Second, patient care requires an interdisciplinary team consistently using outcomes information to make decisions in the best interest of the patient. This speaks to the need to feed back data to clinicians to improve patient care. In the ANA project, researchers found that rarely did the data go past the manager and down to the frontline caregiver. Moreover, they found that physicians believed that they "controlled" care. While this may be true in some situations, it is not true in all. People needed to understand that nursing is not a subset of medicine but a unique discipline. Patients are often in hospitals or on home health care because they require nursing care. Third, ANA recognized that the patient and the family need to be the focus of what we are doing, and we need to incorporate their input into the care. If we do not look at patient attributes, we cannot understand outcomes. We need to link safe and quality patient care to nursing interventions to help secure health care dollars for the future. The ANA project focused on assessing the financial impact of nursing practice.

In 1994 the Patient Safety and Nursing Quality initiative was started. This multi-faceted approach included a focus on research of large databases to identify indicators that have a strong relationship to patient outcomes. It also included an education

component to teach nurses about quality. Part of this education component is now on the Nursing World web site and available to all nurses in the U. S.

There is a difference between nurse-sensitive and nursing-sensitive patient outcomes. Nursing-sensitive outcomes look at a nursing care unit. No nurse is there 24 hours a day; a number of individuals contribute to an outcome along with nursing. Nursing-sensitive outcomes are sensitive to particular aspects of nursing care as opposed to a specific nurse. The indicators that were selected for the patient safety and nursing quality initiative were specific to nursing, could be tracked, had a strong link to nursing quality, and were a subset of indicators identified in previous ANA work, and based on an extensive literature review that ANA conducted. ANA is not in a position to tell organizations what to collect, so it has gone through a process of convincing organizations that they need to collect data about the indicators ANA identified in order to understand nursing care. ANA has a database situated within the Midwest Research Institute (MRI) at the University of Kansas. The MRI designed and maintains the database. There are 200 facilities participating in ANA studies, and we are now at a point where we are able to ask research questions of this database.

The state database initiative is the second stream within the ANA projects. State nurses' associations are involved in these projects. Researchers are collecting information on 10 indicators. Besides collecting primary data, they are also using secondary data to perform state database work and some exploratory work around the indicators captured by the Health Care Financing Administration (HCFA), Medicare, and other state databases. As with other databases, there are problems with the quality of these data.

In March 2000 ANA released a study from nine states. The sample size included (a) an all-Payor sample of more than 9.1 million patients in almost 1,000 hospitals and (b) a Medicare sample of more than 3.8 million patients in over 1,500 hospitals. The nurse staffing data were extremely difficult to collect because these data are reported in different ways by states and within organizations. California has the best database for nurse staffing. A number of datasets were linked to examine the research questions. The exclusion criteria were (a) patients in hospitals whose diagnoses were non-acute, (b) length of stay (LOS) greater than 2 weeks, (c) no staffing data, (d) diagnosis related group (DRG) 469, and (e) DRG 470 ungroupable.

Nursing Intensity Weights (NIW) for New York State was used to adjust for patient complexity. The study takes into account certain risk and intervening variables such as teaching status and the setting in which a hospital operates. An expert panel selected DRGs that they felt related conceptually to nursing practice. Basically they found that the same indicators were consistently statistically significant across years, states, and datasets. These included urinary tract infections (UTIs), post-operative infections, pneumonias, pressure ulcers, and LOS. ANA had hoped for a mental health

indicator, as nursing plays a major role in this area; however, none of these indicators were statistically significant.

An analysis of the five outcomes showed statistically significant relationships with nurse staffing. The questions revolved around nurse staffing and the impact on patient care. At this time in the U. S., we were seeing a decrease in the numbers of registered staff and the number of nurses overall, as well as an increase in assistive personnel. A shorter LOS was related to higher levels of overall staffing. Therefore cutting staff, not just the mix of staff, affects the length of stay. Lower complication rates were associated with a higher mix of registered staff among licensed nursing personnel for four complications. Pressure ulcers show lower rates where both staffing per acuity adjusted day and registered staff mix are higher. Lower rates of pneumonia complications were related to a richer staffing mix. Longer case mix adjusted length of stay was found in primary medical school and other teaching hospitals. Significantly lower rates of pressure ulcers and UTIs were found in primary medical school hospitals. Significantly higher rates of post-operative infections, UTIs, and pressure ulcers were found in large urban areas. The implications of this study are that cutting staff to save money may affect the patients' well-being. We may be subjecting patients to increased pain and suffering and increased costs, some of which the patients pay, because of the changes in numbers and types of nurses. Cutting staff to save money may complicate patient stays, increase lengths of stay, and increase costs. Hospitals have focused on reducing lengths of stay. In the U. S., the average length of stay is now 3.2 days. For the individual hospital, this may result in less of a cost, but there are implications for the system as a whole.

This study demonstrated that nursing care can be quantified and is a critical component of patient care and patient well-being, and that while there is a whole team that cares for patients, nursing contributes something to that care. A consistent relationship exists between nurse staffing and patient outcomes. This study added further evidence to a growing body of research that demonstrates the importance of registered nurses, as well as other nursing personnel, to patient outcomes.

The Nursing Staff Mix Outcomes Study (NSMOS)

The Nursing Staff Mix Outcomes Study examined nursing staff mix models, organizational change strategies, and patient, system, and nurse outcomes. The project was funded by the Canadian Health Services Research Foundation (CHSRF) and the Ontario Council of Teaching Hospitals (OCOTH). The CHSRF mandate is that researchers work closely with the community and provider agencies to develop grants; and for this study, an advisory group was utilized consisting of senior executives within the OCOTH organizations.

The study was designed in 1997/1998, when Ontario hospitals were undergoing considerable downsizing or restructuring at an unprecedented rate. Many changes were made to the nursing staff mix models at this time. Unregulated workers were brought into the mix, however, not to the degree that they had emerged in the U. S. health care system. Hospitals were focusing on reducing length of stays and moving care to the community.

The purpose of the study was to describe the nature of changes in staff mix that were occurring at this time and to evaluate the effects of changes in staff mix on patient, system, and nurse outcomes. Since we wanted to examine whether staff mix variables actually explained variation in outcomes, we focused on the following research questions:

> *Is there a relationship between staff mix and patient outcomes?*
>
> *Is th[illegible]e a relationship between cost and nurse outcomes?*
>
> *Do[illegible]he influence of the staffing model on outcomes vary with the type of care delivery model in place?*

A descriptive, repeated measures design that included primary and secondary data collection was used in this study. During meetings with the stakeholders, the collection of traditional secondary outcome measures (patient falls, medication errors, etc.) was encouraged. In this study, we encountered challenges similar to those in the ANA study regarding the definition of these outcomes. The study took place in 12 teachings hospital sites (19 sites) in Ontario. Geographically the study occurred in five cities. The chief executive officer (CEO) and chief nursing officer (CNO) of each hospital signed on to the study and made a commitment to provide an on-site data collector for the duration of the study. *Tracer conditions* were used to clarify what patient groups would be included in this study. Patient care units from each site provided specific

Case Mix Groupings (CMGs) selected for the study. CMGs were chosen that reflected high volume, high resource intensity and/or cost, longer length of stay and/or higher variation in the length of stay, and were considered to be of importance to organizations, stakeholders, and clinicians. The CMGs included were simple pneumonia, chronic obstructive pulmonary disease (COPD), vaginal delivery, major intestinal procedures, and major gynecological procedures.

For primary data collection, approximately 1,116 nurses completed questionnaires. We used a purposive quota sampling procedure randomly sampling nurses from each of the patient care units involved in the study. Since 2,046 patients were involved in the study, sufficient power was provided to analyze the outcomes. Surveys and/or interviews were conducted with 74 unit managers (representing 77 units) and 64 senior executives such as CEOs, CNOs, human resources, and finance officers. Focus groups were held with nursing staff in each city. Secondary data were collected on cost, medication errors, patient falls, and nosocomial infections.

Several instruments were used to assess the nurse outcomes in this study. Inclusion criteria for nurses were that they had to be working half-time or at least 20 hours a week on the study unit, have 6 months experience, and have agreed to participate in the study. The Shortell instrument (Shortell, Rouseau, Gilles, Devers, & Simons, 1991) assessed system quality. This instrument has subscales related to communication, nursing leadership, unit relations, conflict management, and co-ordination within and between units. The communication subscale achieved a Cronbach's alpha of 0.66; however, the other subscales were in the range 0.80. Another nurse-related outcome we measured was job stress using the Stress in General Scale (Smith et al., 1992) which yielded a Cronbach's alpha of 0.88. The Job in General Scale from the Job Descriptive Index (JDI) (Ironson, Smith, Brannick, Gibson, & Paul, 1989) measured job satisfaction and had a Cronbach's alpha of 0.91. The role tension measure (Lyons, 1971) had a Cronbach's alpha of 0.84.

For system outcomes, we used the Patients Judgement of Hospital Quality Measure (Meterko et al., 1990) to assess patients' perceptions of the quality of nursing care. It yielded a Cronbach's alpha of 0.88. For system cost, we examined health system hours. We tried to look at home care costs, but ran into some challenges with the data. We collected information on re-hospitalization within 6 weeks and on nursing workload. The social costs examined included (a) time to return to employment; (b) days lost from work at 6 weeks and at 10 weeks; and (c) a caregiver burden scale, which is a self-report that captures the time and energy that family caregivers spend in caregiving activities (Cronbach's alphas were 0.90 to 0.92).

The criteria used to select patient outcomes required that the outcome had either a theoretical or an empirical link to nursing practice. Outcomes were selected where

there was empirical evidence to support that a change (improvement/reduction) in the outcome could be observed over a short time frame. The data also had to be available in a reliable manner, be meaningful to the consumers of health care, and have a potentially significant effect on other important outcomes and costs. The Inventory of Functional Status after Childbirth (IFSAC) (Fawcett, Tulman, & Myers, 1988) was used to assess the mother's readiness to assume care and to measure the patient outcome of functional health. It produced a Cronbach's alpha of 0.93. The Functional Independence Measure (FIM)(Keith, Granger, Hamilton, & Sherwin, 1987) yielded a Cronbach's alpha of 0.87 and 0.88, while the SF-36 (Ware, 1993) produced Cronbach's alphas that averaged from 0.73 to 0.99. We used the Brief Pain Inventory (Cleeland, 1989) for the outcome of pain, which yielded Cronbach's alphas from 0.75 to 0.90. For patient falls, medication errors, urinary tract infections, and pneumonia, we performed multi-level analyses using hierarchical linear modeling (HLM) at the individual level.

The FIM was selected because it assesses activities of daily living (ADL) and self-care. Although it was developed for long-term care settings, we reasoned theoretically that if nurses are able to help patients in the acute care setting ambulate after surgery, get dressed, or recover some mobility after a medical insult, then those patients, in the longer term, may do better. It was also reasonable to expect that we might see change in those types of functional activities within the short term, as the study was designed to assess the impact of nursing care on patient outcomes at hospital discharge. The SF-36 was used because it taps into a broader range of health or health quality outcomes than the FIM. Dr. Irvine Doran had previously evaluated this in a study in the community setting and found that it was sensitive to nursing care in this setting. We were interested to see if it was an appropriate measure for use in the acute care setting.

We found that there was a change over time on all of these measures at admission, at discharge, and then from discharge to 6 weeks following discharge. What was interesting was that, while there was a significant linear change on all of these measures, there was also a significant non-linear change on some measures, which reflected the fact that on hospital discharge some patients actually experienced a reduction in functioning. This result reflects the fact that a large proportion of the sample were surgical patients who came into the hospital relatively healthy and then experienced a reduction in their ability to engage in their functional activities at the time of discharge.

Hierarchical linear modeling (HLM) was used to examine the effects of the nurse structural variables on outcome achievement, controlling for all the variables that we could control for in our dataset. This included patient age, education, and medical diagnosis, as well as the complexity of diagnoses from the Canadian Institute for

Health Information (CIHI) data. We controlled for these variables and then looked at what predicted outcomes at hospital discharge and at 6 weeks after hospital discharge. The nurse structural variables predicted FIM scores at hospital discharge, but not at 6 weeks post-discharge. They also predicted pain outcomes at hospital discharge for all groups. Only one of the SF-36 subscales, the social functioning subscale, showed sensitivity to nurse structural variables at hospital discharge. The obstetrical patients' perception of the quality of nursing care was associated with the nurse structural variables, as were the unit rates of medication errors and wound infections.

When we examined which measures were related to unit environment variables, we found that communication between nurses and physicians was related to FIM scores at discharge, pain scores at discharge and 6 weeks later, physical functioning, and patient satisfaction. Interestingly, we found that the quality of communication was related to the patient's likelihood of making an emergency room visit following discharge. The nurse's perception of the technical quality of care was also related to some of the outcomes at discharge and 6 weeks post-discharge. The co-ordination of care was related to physical functioning 6 weeks post-discharge. Finally we looked at whether we could understand patient outcomes within the context of nurse outcomes and found a relationship between nurse job satisfaction and patient satisfaction. At the time of data collection, nurses were experiencing significant role tension related to organizational structural changes and staff changes within their employment places. We found that the experience of role tension, as reflected in ambiguity and conflict around role activities, predicted some of the patient health outcomes at discharge and at 6 weeks post-discharge. It is significant that nurses' role tension was related to mental health outcomes, as opposed to physical outcomes, for patients.

The patient outcomes that we selected were more sensitive to the effect of nursing variables at hospital discharge than at 6 weeks later. This may be because once patients return home, other things affect their health status. We also found that FIM scores were more sensitive to nursing variables at discharge than were many of the SF-36 subscales, but it is important to note that, at 6 weeks, the FIM scores were showing "ceiling effects." One of the questions that the Expert Panel for the Nursing and Health Outcomes Project is trying to contend with is, "Can we introduce a uniform way to collect data on outcomes that can be used in all sectors?" This study suggests that we may need different indicators for different practice settings. There may be some conceptual unity to those indicators, but the indicators' relevance changes as patients change their environment. At discharge they are able to do the things that the FIM taps into, but the SF-36 may be more relevant for the community sector.

Dr. Irvine Doran reported on another recently completed study funded by the National Health Research and Development Program that was specifically designed to examine the

performance of some nursing-sensitive patient outcome measures in acute care settings. This study involved four hospitals and a smaller sample of patients, nurses, unit managers, physicians, and other health care professionals. From the unit managers, data were collected about their unit's staff mix, care delivery model, and the percentage of baccalaureate-prepared nurses on the unit. The nurses supplied us with information about their perception of communication, co-ordination, and the quality of care. Data on the occurrence of nosocomial infections were collected through chart audit. Data on nursing interventions, based on the Nursing Intervention Classification (NIC), were collected through chart audits. From the chart audit, we extracted information regarding whether the nurses had engaged in particular nursing interventions. We conducted inter-rater reliability tests and were successful in getting above 90% agreement from the data collectors. Data on unit communication, co-ordination, and the quality of nursing care were collected from multiple sources, including nurses, physicians, and allied health professionals. Data on patients' functional status were assessed with the FIM and a patient self-report tool, the Stanford Health Assessment Questionnaire (Fries, Spitz, & Young, 1982), in order to test for congruence between the data collector's and patients' perspective on functional status. The Brief Pain Inventory (Cleeland, 1989) was used to collect data about pain. McCorkle and Young's (1978) Symptom Distress Scale was used to collect data on symptom distress. Data on self-care were collected with the Therapeutic Self-Care scale (Sidani & Irvine, 1999). We had two measures for patients' perceived satisfaction with care. The Perceived Health Benefit from Nursing Care (Sidani & Irvine) measured the patients' perspective of how the nurses were able to help them with their health problems. The La Monica et al.'s (LaMonica, Oberst, Madea, & Wolfe, 1986) Patient Satisfaction Scale (LOPSS) measured the patients' satisfaction with the process of nursing care.

In this second study significant improvements were found over time in all our outcome indicators. For this patient population, we did not see the reduction in function at discharge that we found in the NSMOS study; however, this study had fewer surgical patients. We found that the units that had team nursing had better patient outcomes, improved pain outcomes at discharge, and improved functional status outcomes, both as measured by the FIM and the patients' self-report. Units that had a higher percentage of baccalaureate nurses had better improvements in outcomes at discharge. The total number of nursing interventions recorded in the chart were the strongest predictors of outcomes in this study. The total number of nursing interventions recorded on the chart was related to the patients' perception of the benefit they received from nursing care and related to improvement in symptom distress and improvement in functional status, both as measured by the Stanford Health Assessment Questionnaire and the FIM. We measured the influence of co-ordination with two different instruments – Shortell's tool (Shortell et al., 1991) and

Young's tool (Young et al., 1997). We examined both formal and informal co-ordination. Informal means of co-ordination include face-to-face interactions, task groups, and unit meetings, while co-ordination by programming is measured by the use of standard approaches such as care plans. Informal means predicted patient satisfaction with care and patients' perceived health benefit from nursing care. We also found that on units where managers said that they practised patient-centred care, patients experienced improvement in their functional status as measured by the Stanford Health Assessment Questionnaire.

In conclusion, we found that ADL measures are sensitive to nursing care in the hospital setting; however, as evidenced by the OCOTH study, they seem to have "ceiling effects" in the community. Symptom distress and pain outcomes were sensitive to nursing care. In terms of correlation, there was congruence between the patients' self-report on their functional status and the nurse data collectors' assessment of the patients' functional status.

Research Using the Minimum Data Set (MDS) Instruments

The interRAI (Resident Assessment Instruments) group consists of about 40 researchers in 20 countries who work on developing assessment instruments and exploring ways to use assessment data for care planning, quality initiatives, funding applications, and outcome measurement. Research is ongoing within the interRAI group to refine these instruments. interRAI is also interested in cross-national comparisons. The differences amongst interRAI researchers with regard to their backgrounds, the disciplines they represent, and the health care systems in their respective countries allow for robust research about health care.

The Minimum Data Set (MDS) component of the interRAI instruments supports care planning, outcome measurement, quality improvement, and case mix funding. Clinicians report that on average these assessments take about 1–1_ hours to complete. The quality indicators developed by interRAI measure both the process and outcomes of care, and a series of outcome measures to track changes in clinical status over time. All of this information comes from a single data source where the assessment is completed primarily by nurses. Within this system, different applications can be linked together. Data can be used so that there is a funding system whereby the case mix algorithm is responsive to the needs identified in the care plan. For example, we can look at the elements that make patients/residents more or less expensive, in terms of nursing use, other disciplines, and costs. How can we reimburse effectively for more complex patients so that there is not an economic disincentive to care for these individuals? How can we adequately fund for the things that need to be done in their care to improve outcomes? For pressure ulcers, for example, we need a case mix system that takes into account the characteristics associated with pressure ulcers so that care plans can be put in place either to resolve or improve the ulcer in the future. If a particular facility has a disproportionately high number of pressure ulcers, we need to ask why. What can be done to improve the quality of care through better outcomes?

MDS also supports internal quality improvement initiatives. Quality improvement initiatives and outcome measures give quality managers and clinicians a starting point as to where to focus efforts for quality improvement in a systematic way without extra data collection. With MDS we can also link outcome data and care planning data to evaluate best practices. Bernabei et al. (1998) conducted a study linking about 600,000 MDS assessments in the U. S. to prescription drug data to examine the treatment of pain in elderly nursing home residents with cancer. They had about 4,000 people who had daily cancer pain. When they examined patient medication use patterns, they found

that 1/3 of these patients received no analgesia. The probability of having untreated pain increased with the age of the nursing home resident. In Ontario, we currently do not have the drug data linked to MDS; however, within the next year or so we will have these data in some Canadian provinces. Then we can replicate this study to understand how Canada is managing pain for elderly patients in nursing homes. Bernabei et al.'s study put pain management on the front page in the U. S. These results were accomplished from a single data source, the assessment done by the nurses

The RAI Health Informatics Project (RAI-HIP) relates to the family of interRAI instruments. The most well-known is the MDS 2.0, which is used in long-term care and complex continuing care settings. The home care instrument is in the second iteration and it is being used in some Canadian provinces. Also, nine states are using the MDS-HC (Home Care) in addition to the Outcome and Assessment Information Set (OASIS) (Shaughnessy, Crisler, & Schlenker, 1998) because, unlike OASIS, MDS-HC has care planning abilities. Currently, a 10-country European Union study is underway using a randomized clinical trial on the MDS-HC to capture outcomes such as function, service utilization, etc.

Ontario has led the way in the development of RAI for Mental Health. interRAI and the Joint Policy and Planning Committee have been involved in a 4-year project to develop this instrument. A province wide pilot of the RAI-MH has just been completed. This instrument has been translated into four languages. The interRAI group has recently received funding from the Health Care Financing Administration (HCFA) to develop a prospective payment system based on the case mix elements of the RAI-MH.

An acute care instrument is still in the developmental stages and is designed for Alternate Level of Care (ALC) patients. A post-acute instrument has also been designed for rehabilitation settings. interRAI is currently developing a palliative care instrument and a screening instrument to be used with the well-elderly to identify people who may be in need of comprehensive assessment. All interRAI instruments go through the same developmental process. They all start with an analysis of the key clinical problems that need to be assessed so that clinicians can provide care for all the relevant needs of the population in question. We then identify trigger elements that tell us that a particular problem is either currently or imminently at risk of being present. That is, if a person has a recent history of falls or gait disturbances, these are signs that can predict that the person may have a fall in the near future. Hence, the potential for falls needs to be addressed in the care plan. Assessment protocols developed around these clinical areas include (a) clinical algorithms to say how the data from the MDS instruments can be used to identify the potential presence of these problems, (b) background information on the clinical problem (c) further questions to ask to sort out true positives and false positives, and (d) some indicators of potential interventions. The approach is to gather

information and organize it in a way that helps clinicians make decisions. MDS does ***not*** replace the clinician. MDS is supported by significant reliability and validity research within North America and elsewhere. Once these instruments are implemented, interRAI has an ongoing commitment to continue to refine them. interRAI meets twice annually to examine ways to improve its instruments.

In the RAI-HIP integration project, patients were sampled from home care, long-term care, inpatient psychiatry, and acute care. They were assessed with various instruments and tracked over time to determine what their changes are. A particular focus is to see how to make the MDS tools work as an integrated system. It is important to know how to exchange data across settings and what the clinical guidelines are for each setting. For example, how can long-term care guidelines help the nurse in the community manage patients with similar needs.

The following potential scales for outcome measurement are embedded in MDS instruments: a cognitive performance scale that has been validated against the Mini Mental Status Examination (MMSE), and 3 ADL scales – a hierarchical scale, and a short- and long-form summary scale. The capacity also exists to create FIM equivalent scores. There is an index of social engagement for the long-term care setting that measures involvement in the facility, a depression rating scale that can be used across sectors, new scales for measuring pain that have been validated against the visual analog scales, a health status index scale that is a global quality of life scale validated against the health utility index, and a health instability profile measure that measures risk of adverse health outcomes. interRAI is currently developing an aggressive behaviour scale. With MDS, cross-sector comparisons can be done because comparable measures are available across multiple sectors of the health care system to understand the types of patients that we are seeing in different settings.

Work is being done to link outcomes to interventions on the nursing side of health care. For example, MDS offers measures regarding skin treatment, and there are measures on the severity and incidence of pressure ulcers. Therefore, it is possible to see whether interventions put in place reduce the incidence and severity of pressure ulcers. Data are also available on the benefit of nurses' providing range of motion exercises. There are measures of continence so that one can examine whether bladder re-training programs reduce bladder incontinence. These data are in the dataset and are there longitudinally so no further data must be gathered to see whether nursing interventions affect these outcomes.

Data can be used to support care-planning applications. In the case of behaviour disturbance, the overall assessment approach would be for the clinician to gather some initial information about the resident's behaviour. If areas of concern emerged, flags

would go up for a clinical review to be done where the nurse and interdisciplinary team would make a decision about whether this was a true positive and interventions were needed or whether it was a false positive and no intervention was required. Then a care plan would be put in place and a subsequent assessment would be required to determine whether the situation improved. Behaviour care planning gets triggered if such behaviours are noticed as wandering, physical abuse, verbal abuse, socially inappropriate behaviour, and resisting care. Likewise, improvements in behaviour show that something is working and should also trigger care-planning activities. The ability to be able to link some of the outcomes identified in the outcomes data from MDS with staffing inputs would help us to better understand the influences on outcomes.

Discussion

We need to understand the "being," "doing," and "knowing" of nursing. Nursing practice is not static, particularly now with the changing scope of practice and other challenges that are arising. How do we manage this changing role when we are talking about measuring the outcome of nursing?

MDS has a lot of measures integrated into it. These data are used for multiple purposes such as care planning. There is a reason for staff to collect these data, as opposed to collecting data only for Ministry funding. The examples of interventions and outcomes in the MDS dataset illustrate the dilemma of having data but not knowing who is providing the care. This presents a challenge, as we do not know how the nursing care is delivered. This may change over time as we develop the ability to link different databases. It was highlighted that the information that is collected either in MDS, OASIS, or another instrument needs to be sent back to front line staff so they can learn to understand the data and recognize the importance of data quality. The key challenge is how to take these instruments away from researchers and have the information used by clinicians. If these data are to be related to funding, this funding must motivate appropriate behaviour. Outcomes are not an end in themselves but, rather, are part of information for an organization's continuous learning. The data must be fed back to clinicians in a non-judgemental way, so that organizations can identify not only less desirable practices, but also practices that exceed expectations. Therefore, opportunities exist to replicate these practices to improve care. Data often have been used only as a tool to manage cost.

A challenge we currently face is how to use data. Right now we do not have the information systems that we want, but we have information. These are critical years during which we can affect organizational culture around the use of information. This represents an important educational process. Leaders need to be educated not to look at single points in time, in other words, not to react if the numbers go up or down, but rather to look at what is happening over time. They must learn how to use the data to understand what is happening over time. We also need to learn how to invest in the infrastructure of databases to ensure the quality of the data, so that people are not making decisions from data in which they have no confidence. For clinicians to collect and value data, they need to see how it will be used. It is necessary for us to learn to work with staff and organizations in terms of benchmarking. In an integrated health care system, we do have differences in practice; therefore, there are ways in which our data will look different from other datasets because of the way in which we deliver the care. There is a need to incorporate funds for education into funding requests. We need to ensure that people know what the data can and cannot do. If data are only for

one purpose, for example, funding, there is no incentive for clinicians to value data. Collecting data is costly, so we need data that can be used for multiple purposes. Most data collected are for funding; therefore, we are sometimes making decisions using data for a purpose for which they were not designed.

Support was strong for systems that work across the sectors. We may address an issue in one sector, for example, acute care facilities reduction of length of stay; however, there is an impact on other sectors as the patient is discharged to the community "quicker and sicker." Currently decisions are often made in one sector of the health care system without input from other sectors.

State of Science

A Methodological Review of the Literature on Nursing-Sensitive Outcomes

Diane Irvine Doran, RN, PhD
Souraya Sidani, RN, PhD
Judy Watt-Watson, RN, PhD
Heather Laschinger, RN, PhD
Linda McGillis Hall, RN, PhD

Discussion

Diane Irvine Doran, RN, PhD

See previous section for bio.

Souraya Sidani, RN, PhD

Dr. Sidani is an Associate Professor at the Faculty of Nursing, University of Toronto. Her areas of expertise are in research methods, and measurement. She is involved in various studies aimed at evaluating various interventions provided at the individual patient level and at the organizational level. She also collaborated on studies investigating the processes and outcomes of nursing care, and assessing the psychometric properties and clinical of instruments measuring nursing phenomena.

Judy Watt-Watson, RN, PhD

Dr. Watt-Watson is an Associate Professor and Graduate Co-ordinator at the University of Toronto Faculty of Nursing. She is a member of the University of Toronto Centre for the Study of Pain Advisory Committee and a Clinical Associate of the Wasser Pain Management Centre at the Mount Sinai Hospital in Toronto. She is an Associate Editor of the Canadian Pain Society's journal *Pain Research and Management* and the Past-Secretary of the Society. She has served on international, national, and provincial committees to examine standards for pain management practices and curricula for nursing faculties. She has numerous publications including a book *Pain Management: Nursing Perspective* (Mosby) with Marilee Donovan.

Dr. Watt-Watson's research has focused on a) the impact of surgery-related cancer pain and non-malignant chronic pain for patients within a family context, b) the documentation of problematic knowledge and misbeliefs held by nurses and patients that prevent effective pain management in acute care settings, c) pain curricula in Canadian nursing and medical facilities, and most recently on d) interventions involving both nurses and patients to reduce unrelieved pain and improve patients' quality of life. She has recently completed a study that explored the relationship between nurses' empathy, knowledge-beliefs, and pain management practices in acute care. Her current research focuses on education for coronary bypass patients (Heart & Stroke Foundation), a psychoeducation program for chronic pain (CIHR, with Sandra LeFort), and quality of life changes with opioid interventions (Purdue Pharma).

Heather Laschinger, RN, PhD

Dr. Heather Laschinger is Professor and Associate Director Nursing Research in the University of Western Ontario, School of Nursing, Faculty of Health Sciences in London, Ontario, Canada. She is Director of the UWO Nursing Research Unit and is

responsible for facilitating the development and conduct of research within the School of Nursing. She teaches courses in the graduate program related to quantitative research methods, organizational behaviour, and health services research.

Her research interests include workplace empowerment in nursing work settings and the impact of organizational working conditions on nurses' emotional and physical health. Since 1992 she has been Principal Investigator of a program of research designed to investigate nursing work environments using Rosabeth Moss Kanter's organizational empowerment theory. Current directions of this research involve pilot testing of a 'workplace empowerment intervention' with staff nurses in hospital settings and a study to determine the impact of work empowerment conditions on both nurse and patient outcomes.

Dr. Laschinger is Co-Principal Investigator with Dr. Michael Kerr of the Institute of Work and Health of a study designed to investigate factors influencing nurses' health and the feasibility of establishing a mechanism for monitoring nurses' health over time within current restructured health care environments. Dr. Laschinger is a member of the Expert Panel on Outcomes.

Linda McGillis Hall, RN, PhD

See previous section for bio.

State of Science

A Methodological Review of the Literature on Nursing-Sensitive Outcomes

Dr. Irvine Doran

This group of researchers was commissioned to undertake this review (Irvine Doran et al., 2001) by the Ministry of Health and Long-Term Care in Ontario (MOHLTC) for the Nursing and Health Outcomes Project. The review was focused on the following outcomes: functional status, self-care, symptom control, pain, patient satisfaction with nursing care, and nurses' job satisfaction. The objectives of the review were (a) to identify the essential characteristics of a particular outcome concept; and then, (b) through the critical review of the literature, to determine the quality of the evidence and whether or not there was evidence to suggest that this outcome concept could be linked to nursing care; and then (c) to identify the instrument(s) that have been used to measure this outcome; and (d) to review those instruments for their reliability, validity, responsiveness, and sensitivity to nursing care.

Methodology

The methodology that we employed was an exhaustive literature search, primarily of published sources, because of the time frame set by the MOHLTC. This time frame did not allow for pursuing unpublished sources. After we identified the relevant literature, we selected empirical and theoretical pieces for inclusion in the review based on well-defined criteria from a systematic review where all the authors of the literature review used a standard template. We selected conceptual papers if they met the following criteria: (a) they discussed the particular outcome concept, defined it, and discussed its domains; (b) they presented the findings of a concept analysis or a review of the literature synthesizing our understanding of that concept; or (c) they reported the results of qualitative studies that were specifically conducted to enhance our understanding of that outcome concept.

The criteria for selecting which empirical papers to review were (a) whether or not the study described the development of an instrument to measure the outcome concept; (b) whether there were results reporting the psychometric properties of the instrument (c) whether or not the study described the instrument(s) in enough detail to be able to use that information to examine the content validity of the instrument against the conceptual definitions that were developed in the first set of articles; and (d) whether or not the articles reported the results of studies that had examined the relationship between the outcome, nurse relevant structural variables, process variables, or nursing

interventions. Although many instruments have been developed to assess functional status, not a lot of them have been used in studies linked to nursing variables. We excluded those measures if we were unable to link them to a nursing variable.

We noted each study's design in our effort to evaluate the quality of the evidence because different designs inspire more confidence in terms of validity of the study's findings. We extracted information about the characteristics of the study's sample, as well as the study setting, because the mandate of the literature review was to examine relevant outcomes across settings – hospital, home care, and long-term care. In addition, we applied the following criteria when we considered the articles: (a) whether or not the outcome was operationally defined in the article; (b) how it was conceptually defined; (c) whether data were extracted that related to a particular nursing intervention(s), or structure, or process variables; (d) whether any information described the performance of the measure that was used to assess the outcome in the study, (e) whether there was reliability and validity data for the sample in the study, (f) whether or not the study's results included evidence of responsiveness over time to change and sensitivity to nursing interventions; and, finally, (g) how the outcome was assessed, for example, through self-report, observation chart extraction, etc.

Dr. Irvine Doran

Functional Status

The literature search yielded about 211 different sources related to functional status, 73 of which met our inclusion criteria. Sometimes we identified a source but were unable to get it in the time allotted for this work. Our focus was on the nursing literature but, in some cases, non-nursing sources were used when the source was really important to our understanding of the conceptual or methodological issues.

From a conceptual perspective, the early literature focused on activities of daily living (ADLs) and engagement in self-care. We began to see that in the 1980s the concept of functional status broadened to include instrumental activities of daily living (IADLs), which tap role activities and broader activities such as engagement in shopping or cooking. Today functional status is represented as a multi-dimensional construct that taps behavioural items, and cognitive, social psychological, and role activities. Moinour et al.'s 1988 study (as cited in Knight, 2000) was one of the early works that discussed the measurement of functional status in nursing. Moinour defined the measurement of functional status as the following: any systematic attempt to measure the level at which a person is functioning in a variety of areas such as physical health, quality of self-maintenance, quality of role activity, intellectual status, social activities, attitude towards the world and self, and emotional status. Knight, who

offered an interesting conceptual paper on functional status, argued strongly in favour of recognizing that functional status should include cognitive performance such as attention, ability to concentrate, memory, and problem-solving abilities, along with behavioural elements. Under the behavioural category, Knight grouped ADL and IADL type items and then psychological items reflecting components such as mood, affect, and motivation. Empirical papers help us not only to understand the concept, but also to see how the concept is used in research. The operational definitions of functioning reflect physical and social functioning, role functioning, cognitive and mental functioning, and the ability to manage self-care.

Issues concerning the measurement of functional status that emerged from the literature focus on the problem with multiple terminology. The term functional status is used to measure everything from functional capacity or functional ability to functional performance or mobility. Therefore, clarity around the concept is necessary when we are going to measure functional status. Also, whose perspective should we assess? Some work indicated that nurses' and other health care professionals' assessments of functional status usually differed from the patients' perspectives. So, if the instruments are based on the nurse's assessment, we need to ask if they provide valid indications of the patient's actual performance. What constitutes a good outcome? Dr. Hirdes and others have made the point that for some populations, improvements in functional status may not be the goal; rather, preventing decline or focusing on the rate of decline may be more important when decline is ultimately inevitable. Often measures do not take into account the fact that clients are able to perform their ADLs with the help of aids such as a cane, or other helpers in the home or long-term care setting. When measuring for functional status, we need to consider controlling for situational variation, motivational factors, and cultural/role expectations. What is an appropriate role activity for one cultural group or one gender group may not be an expectation for another. Rubenstein, Schairer, Wieland, and Kane, (1984) discussed the limitations of IADL items in institutional settings. IADL may be difficult to measure for patients in acute care settings because they are artificially constrained in their ability to engage in their typical role activities. Collecting functional status data from secondary sources is problematic. Burns et al. (1992) evaluated the congruence between self-report of functional status and data that were extracted from the health record and found that the percent of agreement varied from 20% congruence between self-report and medical record abstraction for bathing items to about 50% for dressing items. Clearly, relying on data from the medical record will not yield enough information for us to feel confident about functional status outcomes.

Is functional status a relevant outcome for nursing care? The first set of studies we analyzed were six random control trials (RCTs) that examined the relationship between nursing interventions and functional status. The results of these studies did

not support functional status as a nursing-sensitive outcome. However in these RCTs, the nursing interventions varied, different measurements were used for functional status, and the nursing interventions that were examined in the study took place in very different practice settings. Therefore, before we dismiss functional status as a nursing-sensitive outcome, we must look at other studies. The quasi-experimental studies were more supportive of functional status as a nursing-sensitive outcome in relation to both nursing interventions and the structural inputs of nursing.

Next we examined what instruments were being used and which ones were more sensitive to nursing variables. Katz's tool (Katz & Akpom, 1976) was widely used. All studies reviewed concerning this tool provided evidence that nursing interventions affect functional health outcomes. Studies using the Older Americans Resource and Services Questionnaire (OARS) did not demonstrate such sensitivity, whereas studies using the Barthel instrument varied (Malhoney, Wood, & Barthel, 1958).

The results of the empirical review concerning functional status include the following: we still need empirical work to establish the sensitivity of functional status as an outcome in different practice settings. We need to decide what aspects/dimensions or components of functional status we need to measure to link to nursing practice. These items may vary between practice settings. While the evidence is not overwhelming to support the concept that functional status is sensitive to nursing care, it is mounting.

Dr. Sidani

Self-Care

Self-care was addressed in over 350 publications. The majority of these presented theories or models of self-care or reviewed the conceptual literature pertinent to self-care. Self-care was viewed in two ways. First, it was viewed as a process that is initiated by individuals in response to a demand or need, and that involves the following: self-observation or monitoring, identification of changes in functioning, judgement as to the meaning and severity of these changes, assessment of options for actions, and selection and performance of appropriate actions to manage these changes. Alternatively, as a process, self-care formed the framework to guide the design, organization, and implementation of nursing care. In particular, the process of self-care is the framework underlying the design of educational and psycho-educational nursing interventions delivered to various client populations across the health care continuum.

Second, self-care was viewed as an outcome of nursing care. As such, self-care has been generally defined as the practice of actions or behaviours undertaken by individuals to maintain life, healthy functioning, and well-being. The behaviours are

initiated by the individuals, either independently or in collaboration with health care professionals. They are performed to achieve such health-related goals as promoting, maintaining, or enhancing health; preventing illness; detecting and managing symptoms; or restoring functioning.

The operationalization of self-care as an outcome of nursing care varied across publications. This variability was a function of (a) the health-related demands or situation being investigated; (b) the purpose for which the self-care behaviours were performed, such as health promotion, illness prevention, health maintenance, rehabilitation, symptom management, or recovery from illness or surgery; (c) the client population targeted, such as children or older adults; and (d) the setting of care delivery. The self-care behaviours most commonly measured included a combination of behaviours aimed at promoting and maintaining health, such as exercise and nutrition, and at managing the presenting problem related to illness. The latter behaviours were related to the implementation of the prescribed therapeutic regimens, for example, taking medications and adhering to fluid restrictions, and to strategies for recognizing and monitoring changes in their conditions.

Engagement in self-care behaviours was investigated as an outcome of nursing in 23 of the studies reviewed. All of them aimed at evaluating the educational or psycho-educational interventions a nurse provided to a patient with acute or chronic conditions. The interventions involved providing patients with the information and resources needed to perform self-care behaviours, and assisting them in incorporating the self-care behaviours in their everyday lives. The specific self-care behaviours addressed varied across the studies. They included strategies to manage the side effects of cancer treatment, self-adjustment of medication for managing COPD, post-operative exercises and ambulation, dietary and fluid intake as recommended, exercise, or walking. The results of methodologically sound studies indicated that educational or psycho-educational interventions were effective in improving patient performance of self-care behaviours. This conclusion was supported by the results of meta-analytic studies that reviewed the effects of educational and psycho-educational interventions on various outcomes that are considered reflective of self-care.

The empirical evidence reviewed supports the conclusion that patient education provided by a nurse, with a focus on the process of self-care, is effective in improving performance of specific self-care behaviours, particularly those targeted by the educational intervention. Thus, self-care is an0 outcome that is sensitive to nursing care. The actual measurement of self-care behaviour requires further investigation if the goal is to have an instrument that captures the combination of self-care behaviours aimed at promoting health and managing the presenting problem, and that is applicable and relevant to various client populations.

Dr. Sidani

Symptom Management

Effective symptom management has been identified as an outcome of nursing care. Symptoms are identified as subjective sensations that reflect a change in normal functioning. Such symptoms are experienced by patients with various acute and chronic conditions. They represent the reason persons most frequently cite for seeking health care and are, therefore, a primary concern to patients and health care professionals. Symptoms interfere with the person's physical, psychological, and social functioning. If not managed effectively and controlled, symptoms have devastating consequences for the patient, the family, and the health care system. Uncontrolled symptoms may lead to emotional distress, co-morbid conditions such as sleep disruption and discomfort, and to increased utilization of health services. Symptom management is considered an important component of nursing care for different patient populations, but it has taken precedence in the care of patients with chronic illness, particularly patients with cancer. The debilitating nature and the untoward consequences of symptoms underscore the importance of adequate management.

Symptom management involves (a) identifying and recognizing symptoms; (b) appropriately interpreting symptoms; (c) monitoring and evaluating symptoms; and (d) selecting strategies for relieving the symptoms experienced, for enhancing functioning, and for evaluating the effectiveness of the strategies. Effective symptom management begins with their accurate and comprehensive assessment. Such an assessment requires enquiring about the following: the patient's subjective experience of the symptoms; the multiple dimensions of each symptom experienced, including its frequency, duration, impact, or distress; the symptom's meaning to the patient; the patient's response to the symptom; the factors that aggravated or alleviated the symptom; and strategies the patient applied to manage the symptom. The results of such an assessment guide nurses in planning the most appropriate care to assist patients in relieving the symptoms experienced.

Simple global items, with a visual analogue or numeric rating scale, have been advocated and used to measure symptom severity as a means of monitoring and evaluating the effectiveness of nursing care. These one-item scales were found to be valid in capturing the symptom being assessed and sensitive to change in the level of symptom severity observed over time and/or following treatment (Youngblutt & Casper, 1993). Further, they take minimal time to complete, thereby reducing response burden. They are useful and relevant in clinical practice, and they have been incorporated successfully in practice, as illustrated by their use in measuring pain.

The specific symptoms to be measured will vary with the patient population of interest. Patients with different chronic conditions experience different sets of

symptoms, based on the patho-physiological mechanisms underlying the illness and on the side effects of its treatment. For instance, nausea and vomiting may be reported by patients with cancer who are receiving chemotherapy, but they are not reported by patients with cardiac conditions. Similarly, the specific interventions prescribed and/or found effective in managing symptoms vary, depending on the nature of the symptoms. Educational or psycho-social or psycho-educational interventions have been designed to assist patients in adjusting to chronic illness, and to provide them with the knowledge and skills to recognize and manage symptoms they may experience.

The evidence supports the conclusion that specific nursing interventions targeting a particular symptom, as well as patient education provided by nurses, are effective in relieving the severity of symptoms patients experience. Thus, symptom management, reflected by the reduced severity of the symptoms experienced, is sensitive to nursing care. Symptom measurement can easily be incorporated into clinical practice. Nurses inquire about symptoms as part of their routine patient assessment. Global items with numeric rating scales similar to those used for assessing pain could be used to document the severity of symptoms experienced before and after nursing care.

Dr. Watt-Watson

Pain as a Symptom Outcome

Pain, as a symptom, has been documented as evidence of ineffective pain management since 1973. In the 1980s and early 1990s, investigators tried to establish some determinants of this problem by beginning to focus on gaps in knowledge, particularly for health care professionals, but also for patients. This approach was followed by the development of pain education programs to try to resolve the problem; however, the impact of the educational intervention was minimally examined. It was really a period of pre-post-intervention testing. In the later 1990s, investigators began to look at pain management outcomes.

This review of the literature yielded 53 relevant sources with pain as a major concept; however, only 17 met the inclusion criteria. Papers that had a non-nursing intervention were excluded. Melzack & Wall (1965) conceptualized pain as a complex integration of sensory affective and cognitive dimensions. Their theory formed the basis of the International Association for the Study of Pain's definition that pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. This definition reflects the concept that pain is more than a sensation.

Two key issues are involved in pain assessment. One concerns the lack of a standardization of measures and the second, the mediators of pain assessment. Pain

assessment is not frequently a routine part of nursing practice. Patients do not identify nurses as a resource regarding pain management. Pain is underestimated. Nurses identify behaviours as a major indicator of pain; they do not believe patients' self-report about pain. Less than 50% of prescribed analgesia is given to patients in acute care settings despite their experiencing moderate to severe pain. Questions exist about the mediators of assessment. Nurses' experiences and beliefs affect what happens in pain management. Patients' characteristics influence assessments, that is, if they are older, female, and from an ethnic minority, they will have the least chance of receiving opiode analgesics. Patient beliefs and expectations affect how their pain is managed. Since pain is subjective, pain measurement issues are multi-dimensional and complex. While pain sensation, the severity of pain and intensity, and analgesic use are very important outcomes, we also need to know the impact of the pain for the individual.

The most commonly used measures in the literature reviewed were the uni-dimensional visual analogue scale and the numeric rating scale. The McGill Pain Inventory (Melzack, 1975) has extended the assessment component regarding pain intensity to include quantitative and qualitative components. The Brief Pain Inventory (Cleeland, 1989) has been used for looking at pain intensity along with interference in usual activities.

In studies that examined whether pain was an outcome of nursing care where change was evident, the interventions focused on non-pharmacological methods such as music, therapeutic touch, cutaneous stimulation, patient's education, and nurse's education. The results were equivocal, probably for many reasons, but a major one was the methodological problems and issues concerning sample size. In terms of non-pharmacological interventions related to pain as an outcome, no significant effects were reported with music during chest tube removal, nor with therapeutic touch in terms of headache or surgical patients. In a meta-analysis, Sindhu (1996) showed that relaxation has some positive effects; however, the heterogeneity of the sample made this study's result difficult to interpret. Results have been mixed using relaxation. Pain medication has been shown to have a positive impact with orthopaedics, cancer, and chronic pain patients. Nurses' education has been shown to make a difference in terms of pain intensity.

I recommend that we need to have pain outcomes that are responsive to the various interventions currently in practice. We need to use multi-dimensional measures that reflect the complexity of pain and its impact on everyday activities such as the functional component. Pain intensity is a good outcome category, but it is narrow in terms of what the issues are related to interventions. We need more research about the relationship between mediators of pain outcomes in terms of the system and individual determinants.

Dr. Laschinger

Patient Satisfaction with Nursing Care

Patient satisfaction has been a concept since the 1950s, when it was used to evaluate aspects of medical care. Many nurse researchers have focused on satisfaction with nursing care; however, a number of definitions exist for the concept. The dominant definition is that patient satisfaction is a function of the congruence between what patients expect to get from care and what they actually receive. Yet there is minimal data demonstrating that expectations have much of an effect. Rather, it is how patients feel that is the predictor of overall satisfaction. Others have argued that patient satisfaction is a general response to the care, rather than an evaluation of the care experience. Eriksen (1995), who conducted an extensive concept analysis, best defined patient satisfaction with nursing care as a result of the patients' evaluation of the degree of congruence between their expectations of the nurse and their perception of actual nursing behaviours or characteristics. Eriksen introduced into the definition the aspect that patient satisfaction is cognitive as well as affective. The literature reviewed supports the conclusion that patient satisfaction with nursing care is the best predictor of the overall satisfaction with the care episode. There is no doubt that patient satisfaction is an important outcome and sensitive to nursing activities.

The studies reviewed utilized different instruments, which reflected the variety of existing instruments. The one indicator that emerged repeatedly as a predictor of how satisfied patients were with their care was the interpersonal, interactional aspects of care, that is, caring and compassion, which represent the non-technical aspects of care. The other important predictor of satisfaction with nursing care was the importance of information sharing and interpretation of symptoms. This indicator involves patients' concerns and the ability of health care professionals to explain their care in meaningful ways. Similarly, patient involvement with decision making and mutual sharing were important to patients. The patient's perception of the nurse's competence was reflected as being important to patient satisfaction in some studies, whereas others supported the conclusion that although patients may not be able to evaluate the nurse's technical expertise, they can evaluate how this technical care was delivered. Most instruments had one or two items related to the technical aspects of care. Another predictor of satisfaction with nursing care was the actual health status at discharge. The better the patients' health status, the happier they were with their care. In some studies, patients' expectations were found to be a predictor of satisfaction with nursing care. Promptness and timeliness were important factors to patients. Nursing job satisfaction was a predictor of patient satisfaction in some studies (Atkins, Marshall, & Javagli, 1996; Kaldenberg, 1999; Leiter, Harvie, & Frizzel, 1998; Weisman &

Nathanson, 1985). Demographics may also play a role. Some studies have shown that females or older people are more satisfied, while others are not. Furthermore, some aspects of the nursing care delivery system, such as team nursing and primary nursing, have been shown to influence patient satisfaction.

In terms of outcomes, the studies evaluated in the literature review show patient satisfaction as a mediator of future behaviour such as compliance with treatment, but more commonly with the intention to use the service again. Although this is an important area for Health Maintenance Organizations in the U. S., nursing research is not really concerned with this area.

Measurement has been an issue with regard to patient satisfaction. Most often remarked upon are the high scores for patient satisfaction. This affects the statistical analysis of the data. Some suggestions for handling this situation included changing the response score. Ware, Snyder, Wright, and Davies (1983) suggested that asking patients to agree or disagree is a better way of addressing the problem. Another suggestion involved asking patients to list area(s) where they had problems, rather than asking them to list what was good.

When measuring satisfaction, we have to consider whose perspective is being evaluated, the provider's or the patient's. A lot of research shows that what nurses think is important is not necessarily what patients think is valuable. Some studies reported that nurses consistently overestimated the importance of emotional care, whereas patients tended to emphasize technical care. Over the last 5 years, the research focus has been on both providers' and patients' perspectives.

Another important measurement factor is timing, that is, whether satisfaction is measured at discharge, 3 weeks later, or months later. Non-response is a problem too, as the literature reported a 30% return rate in surveys about satisfaction. Research has demonstrated that the response rate is better at discharge. Proxy measurement is another area that should be considered. Relatives tend to be more negative in rating care than patients are. Moreover, differences exist in cultural expectations about what care should involve. Little research shows that patient satisfaction is sensitive to particular nursing interventions.

With regard to recommendations, the literature reviewed supported that there is a lack of theoretical models to explain the nature of patient satisfaction. Lacking, too, is an understanding of how patients form their judgements about health care. Although there are some models, more research is needed to contribute to this knowledge base. It would be beneficial to have a core set of questions that are common to all instruments, so that when studies are examined, we could compare variables across settings and across time. Both global and specific items in the instruments are needed. Scoring methods that maximize variability are required, with scales weighted

according to the importance that patients place on items. Satisfaction instruments should contain salient items that reflect nursing care. Instruments must be of a length that patients can deal with, that is, 10-15 items.

Dr. McGillis Hall

Nurses' Job Satisfaction

Job satisfaction, the extent to which employees like their work, is one of the most studied concepts in organizational research (Agho, 1993). Much of the work in this area emerges out of research from the 1960s, although interest in nursing job satisfaction has been evident since 1940 (Nahm, 1940). Most of the research has been directed towards identifying the determinants of job satisfaction, its effects on job performance, and individual employee behaviour towards the work setting (e. g., organizational commitment, absenteeism, turnover). Within the discipline of nursing, a great deal of attention has been focused on the examination of nursing job satisfaction and how it relates to nurse turnover (Blegen & Mueller, 1987; Irvine & Evans, 1995; Price & Mueller, 1981). A meta-analysis of 48 studies of job satisfaction identified that stress and organizational commitment were highly related to nursing job satisfaction (Blegen, 1993). Research has also indicated that nurses' job satisfaction is associated with several personal, organizational, and contextual characteristics (Cavanagh, 1992). Thus, the job satisfaction of nurses can be considered of central importance when examining the effect of nursing interventions on patient outcomes.

Of the many sources found that cited nursing job satisfaction, only 84 met the inclusion criteria for this review. Considerable research about job satisfaction has occurred outside of nursing. Much of the research on nurses' job satisfaction emerged from the 1960s, when the focus was on identifying the determinants of job satisfaction and its effects on job performance and individual behaviours toward the work setting. Job satisfaction is a well developed area of research, both generally and for nursing. We have instruments specific to job satisfaction that have been developed and tested, as well as instruments that, while not specific to the practice of nursing, have been employed on the nursing population. Many are theoretically based with significant conceptualization behind them. Most tap multiple dimensions; however, the challenge is to identify which dimensions are important.

The Index of Work Satisfaction (Stamps & Piedmonte, 1986) measures pay, autonomy, tasks, organizational characteristics, and interactions within the work setting. It is the most widely used measure of nursing job satisfaction in the literature, but there are problems with some of its subscales. The McCloskey Muller Satisfaction Scale (Mueller & McCloskey, 1990) captures similar dimensions but is broader and has good

psychometric characteristics. The Job Descriptive Index (Smith, Kendall, & Hulin, 1969) is not a nursing measure but is the most widely used measure in the social sciences index. It is an excellent measure that captures work, pay, promotional opportunities, supervision, and relationships with co-workers. The Nursing Job Satisfaction Scale (Hinshaw & Atwood, 1983) assesses quality of care, enjoyment, and time to do the job. It also has a separate scale that examines occupational satisfaction; however, this scale is not often used. Each of these instruments appears to have been carefully developed with appropriate attention to construct validity, and most have been applied broadly across a number of demographic groups within nursing. Most have had reliability assessed on an ongoing basis through multiple applications of the instruments in a variety of settings and countries. However, for the most part, little or no attention has been paid to any ongoing assessment of their validity.

There are global measures that capture job satisfaction and facet-specific measures that get at specific components of the job. It is important to consider what you want to capture when you are trying to link job satisfaction to outcomes. We should also consider whether we need a nurse-specific measure of a general measure. We must question, too, whether the instruments capture the issues relevant to our current work environment.

Further empirical work is needed to establish the measures' sensitivity to nursing job satisfaction. Some instruments miss elements such as job strain and job stress. These are important concepts that need to be addressed, especially considering the current environment in which nurses practice.

Discussion

Nursing-Sensitive Outcomes

Our task from the Ministry of Health and Long-Term Care was to identify nursing-sensitive outcomes that could be captured on databases. The Expert Panel on Outcomes is moving towards consensus on the following outcomes: functional status, self-care, symptom management, patient satisfaction with nursing care, and nurse job satisfaction. However, issues exist concerning measurement as well as which instruments to use to measure these outcomes. For the future, we are looking toward system integration of the outcomes and, ultimately, a potential funding link.

In measurement, there are psychometric issues with these constructs in terms of both global and component measurements or a combination of these. In addition, all the concepts are multi-dimensional. Also, the construct "quality of life" overlaps with "patient well-being." These circumstances add difficulty to operational definitions. Timing and frequency of measurement are also important concerns from a pragmatic perspective. We must consider from whose perspective the data have been collected, the provider's, the patient's, or both. The more information that has to be collected, the greater the cost. The Expert Panel on Outcomes supports the view that measures include patient and/or family perspectives.

Self-care is a provider value and, in a sense, it is a societal value. But the language used to describe or assess self-care can be problematic. Dr. Grobe reported to the group that in a study in which she was involved, people were interviewed about patient education. The researchers had empirical data to support the finding that nurses spent 55% of their time on patient teaching; but when patients were asked about the teaching that they received from the registered nurse, fewer than 3% said that they had been taught by the nurse. They did state that the nurse had given them advice about how to care for themselves, but they did not perceive this as education. Patients do not have a goal of self-care. Their goal is to live their life as best they can. If we use self-care as an outcome, we must define it so that people understand what this term means. We may need to change the name. Sometimes we use ADL/IADL to mean self-care, other times we use the term in relation to people's ability to manage their medical procedures, and still other times we use it to refer to tasks that we are trying to transfer to the patient/family. The Institute of Medicine discusses self-care in terms of staying healthy, getting better, living and coping with illness, and dying well. We must consider these elements of self-care. The symptom management and self-care outcome categories overlap, which may highlight the need for a change in language.

The Health Status Outcomes Dimension instrument (HSOD) defines self-care as people's ability and knowledge to engage in their care. Front line nurses stated in

interviews that although they did not feel that promoting self-care was solely the province of nursing, helping people engage in their self-care and providing education to clients so that they would have the knowledge to manage constituted a major part of nursing's role. How do you measure knowledge? Do we use a condition-specific or generic measure? How do we use a single instrument from birth to death? We need concrete measures that patients understand. For the HSOD, researchers focused on the patients' understanding of why they were seeing a provider and on whether they had the knowledge they needed to manage their care at that time.

In the U. S., the average hospital length of stay is 4.4 days. We need to question what are reasonable outcomes to accomplish within this time frame. We may improve functional status, but how much of a difference do we make in self-care within 4 days. When do we measure this improvement? What is the episode of care? There are multiple outcomes at different times, which has an impact on when we measure. What are the outcomes for the acute care setting that can be measured over 4 days, versus the outcomes for community care? Also, what are the nursing variables that influence these outcomes? Patterns of change may be different from one sector to another. Furthermore, the rate of change may be important.

There is some overlap between the outcome categories of functional status, self-care, and symptom management. Therefore, we need to make these constructs clear. Although there are many generic and disease-specific measures, there is also enormous overlap in the instruments. We need to focus on the items and then work from the constructs that are important. Moreover, we require definitions that both the clinician and the patient can understand.

Currently a lot of marketing of measures is being done. It is important to make a decision on the outcome to be captured, develop a definition for it, and then move forward to work with it and refine it rather than to spend too much time developing the Cadillac of instruments or measures. What are the core measures that we need to collect across the continuum to begin with? We could always add on later. People in different sectors have similar issues; for example, ambulation and self-care are important outcomes in all sectors of the health care system.

Participants highlighted that data are costly to gather. Whenever we select a measure, it is important that it serve multiple purposes. The data must help clinicians manage care and help stakeholders understand what is happening to the population. If it cannot do both, it may not have enough value.

Agreement was reached that both the provider's and the client's perspectives are important. Neither is right or wrong. Both perspectives add richness to the data.

Work Environment

Nurses' work environment is not a patient outcome, but it represents an important variable that has an impact on the quality of patient care. A nurse's work environment is at the unit level, not the organizational level. The group was questioned about whether we should pursue an environmental measure and, if so, how we would collect these data. What should we look for as a measure?

Questions arose about our mission. Is adding this component important? Including the category of nurses' job satisfaction would add a tremendous cost to data collection. Change must be understood over time, so data must be collected regularly. The point was made that researchers should never collect data if they are not going to feed it back to people or they are not going to respond to it, because this is a violation of trust.

Most people felt that we need to look at the area of work environment because it is too important to ignore. Dr. Grobe reported that the Nursing Work Index was used in a Texas study and provided some very interesting data. If you do not capture data about the work environment you may be comparing apples to oranges. The Nursing Work Index indicated tremendous variations between nursing units. For nurses, this result is important. The challenge is how to collect the information. Sampling so many nurses from each unit is a sampling nightmare. It was proposed that we sample nurses every 2 –3 years through the College of Nurses. It is crucial to know under what conditions outcomes occur. It was highlighted that the practice environment includes more than just nurses. It may be that nursing is a reasonable proxy for other health care professionals; however, if researchers want anyone else to pay attention to their work, they may want to include other health care professionals in surveys about the work environment.

There is a need to differentiate between the information necessary to enable organizations to understand why they are getting good or bad outcomes and the identification of a critical set of quality indicators that could be measured over time to evaluate the success of the system. We cannot measure all explanatory variables. What are the elements that we need to leave up to organizations to examine to diagnose their problems and improve care? What do we need, as a system, to track over time to understand how the system is functioning?

One low cost solution is possible for getting some work environment data. Researchers who conduct social network analysis collect data on the individual attributes of the person responding to the network questionnaire, as well as on the characteristics of all the respondents in the network. They then aggregate the network data to describe the network and treat it as an attribute of the individual.

In the CIHI database, some data are available at the functional centre level, whereas other data are available only at the organizational level. If we had a unique unit

identifier, we could examine unit outcomes. A unit identifier is not currently available. For nursing units we need to collect information about the formal and informal communication, as well as other factors. What measure should we use? How would we get the characteristics of the unit? These issues are important. A unique provider identifier would allow us to link nurses to units.

Theoretically and conceptually outcomes are affected by processes and inputs; therefore, we need to understand the "inputs" of nursing. Because the environment is changing, the context of practice is changing. In order to measure changes over time, we need to measure the context. Will what we do be meaningful if we do not measure the inputs of nursing?

This current project represents the start of getting outcomes that matter on to databases. This work is just the beginning; as the science moves ahead, perhaps we will be able to add other items.

Ongoing Issues and Challenges

Capturing Nurses Work

Susan Grobe, PhD, RN, FAAN

Implications of Multi-level Modeling for Nursing Systems Outcomes Research

Barbara Mark, PhD, RN

Continuity Across Sectors

Mary Lush, PhD, RN

Discussion

Susan Grobe, PhD, RN, FAAN

Dr. Grobe is currently LaQuinta Professor of Nursing and former Professor and Director of the Center for Health Care Research and Evaluation at The University of Texas at Austin School of Nursing. In her faculty role she has mentored nursing informatics doctoral candidates and graduates. Dr. Grobe authored one of the first books on computers for nurses, Computer Primer & Resource Guide for Nurses (1984) and developed an authoring system on nursing process, Nursing Education Module Authoring System (1985) supported by the Division of Nursing, DHHS. Dr. Grobe is currently principal investigator on a study to classify nursing interventions supported by the National Center for Nursing Research and the National Library of Medicine. She has consulted with nurse researchers and nursing organizations nationally and internationally, and has authored many articles on nursing informatics in national and international journals and proceedings.

Barbara Mark, PhD, RN

Dr. Barbara Mark holds the Sarah Frances Russell Distinguished Professorship of Nursing Systems at the University of North Carolina at Chapel Hill. Dr. Mark received her bachelors degree from Skidmore College, her masters from University of Washington, and her doctorate from Case Western Reserve University. She is also a fellow of the American Academy of Nursing.

In her prior position at the Medical College of Virginia, Virginia Commonwealth University, Dr. Mark was responsible for the development of graduate programs in nursing administration preparing both nurse executives and nurse managers. In addition, she developed, initiated, and directed the school's doctoral program, and was chair of the Department of Nursing Administration and Information Systems.

For nearly 20 years, Dr. Mark has been involved in studying the organization of acute care nursing and its relationship to outcomes and the effectiveness of acute care hospitals. Her research is currently funded by the National Institute of Nursing Research as well as the Agency for Healthcare Quality and Research. Dr. Mark's contribution to developing a theoretically-based understanding of the relationship between the organization and outcomes of care is evident in her more than 50 publications. Dr. Mark is nationally and internationally known for her expertise in organization theory and outcomes research, and is widely sought as a speaker, and as a consultant and reviewer for scholarly journals and grant programs.

Mary Lush, PhD, RN

Dr. Lush has 12 years of experience in the management of nursing systems in the California Division of the Kaiser Permanente Medical Care Program. During her initial work with Kaiser Permanente, Dr. Lush was responsible for the oversight of all nursing systems in the acute care settings. This included the re-implementation of region-wide nursing workload measurement and administrative systems that supported the development of a nursing utilization database to cost out hospital based nursing services. Dr. Lush created and directed the evolution of the Outcomes Taskforce and the development and testing of the Health Status Outcome Dimensions instrument. This instrument was designed collect cross-continuum patient health data during the normal course of care. The data would be used to evaluate the process and outcomes of that care. Dr. Lush also participated in the effort to develop a human response nomenclature for inclusion in a convergent medical terminology that is foundational to an effective program-wide clinical information system.

Currently, Dr. Lush is the Director of Home Care and Skilled Nursing Facility Quality Assessment and Improvement. Priorities include shaping the organizational culture and systems needed to support outcomes based performance improvement in these critical, continuum-of-care programs.

Dr. Lush's numerous presentations and publications have focused on the cultural issues, challenges and learnings related to the implementation of nursing systems in a large, integrated healthcare program. Dr. Lush's research focus has been on the development and testing of the clinical instruments needed to support the evaluation of health outcomes across the continuum of care. Dr. Lush was presented the Harriet H. Werley Award from the American Medical Informatics Association in recognition of the paper making the greatest contribution to the advancement of the field of nursing informatics.

Capturing Nurses' Work

The Context of the Health Care Environment

The environment in which nurses work is affected by many different things. In the U. S., the Institute of Medicine (IOM) report, *To Err is Human: Building a Safer Health* System (1999), had a major impact on the health care system. This report stated that medical errors are attributable to organizational systems, not necessarily to providers. The recent IOM study (2001), *Crossing the Quality Chasm: A New Health System for the 21st Century*, focused on best practices, information technology to assess clinical information, knowledge and skills management, effective teams, co-ordination of care across the continuum, and incorporation of performance in outcome measures.

In the U. S. the Health Care Financing Administration (HCFA) and Agency for Healthcare Research and Quality (ARCH), with input from stakeholders, recently began a research agenda to identify, pilot test, and evaluate the various options for better aligning current payment for health care services with quality goals.

The context/environment in which nurses work is also framed by the nursing minimum data set, which represents an attempt to describe nursing care and achieve comparability of data across populations, settings, areas, time, and organizations. This minimum data set consists of the following nursing care elements: nursing diagnosis/problems, nursing interventions/activities, nursing outcomes/goals, and intensity of nursing care. Moreover, when people talk about intensity of nursing care, it is necessary to clarify whether they are describing how much care was given, how complex the care was, or whether the intensity measure represents a combination of both elements. An additional element is needed that represents the focus of the nursing care and the context of the organization within which the care is occurring. To fully support use of the minimum data set, we will require a unique number for nurses.

Trends in Informatics

A trend is evolving away from a single vocabulary towards concept-oriented terminologies that will facilitate data use rather than letting us make traditional classifications. Coenen, Marin, Park, and Bakken (2001) discussed nursing activities modeled for use within a context-oriented terminology system. These authors proposed a type of definition for nursing activities that included a delivery mode, an activity focus, and a recipient. The activity focus dimension fits with proposals for adding a focus for the intervention in nursing care. The International Classification of Nursing Practice (ICNP) has developed a conceptual approach to defining nurses' work that has been adopted in 35 countries around the world. More than a classification, it is, rather, a stimulus for discussing nursing concepts.

We are noticing evolving messaging standards that accommodate activity-based care, for example, Health Level 7 (HL7). The teaching role of nursing has been absent in this area; but now a vocabulary terminology group is working with informatics groups to determine if the HL7 information model accommodates the teaching aspect of nursing practice. We continue to struggle with determining the appropriate level of granularity for nursing terms and for representing nursing data: is it nursing actions as indicators of nursing's contribution to patient care, is it intensity, is it a count of interventions, or is it a proportion of interventions by category that represents the focus of nursing care? While the proposed information models accommodate continuous care over time and settings, the messaging standards and information models are critical as patients move between and among settings with unresolved outcomes. These outcomes are also contributed to by more that one type of provider at different points in time.

Language

Words reflect and co-create meaning. Meanings are illuminated in words. Language has an evolutionary pattern of symbols from which we draw meanings for the moment. Fluid and ever changing, all language evolves gradually, shifting the meaning of words and a system of words. Nothing never changes. We need to be careful how we label things. For example, in the business orientation model, we use the words delivery system, consumer, cost-effectiveness, products, and nurses' work. In a caring and human services model, with a focus on satisfaction, safety, and the care of persons, we use nursing care services. There is a difference between the language of business and that of healthcare; however, the data remains, regardless of the names or labels.

Competing Challenges

Historically, we have used proxies to represent nurses' work, for example, hours of care, numbers of tasks, and care requirements based on acuity and severity, primarily to justify having enough nurses. We continue to use these same indicators in attempts to find relationships between the number of nurses and outcomes of care, or relationships between skill mix and outcomes. We have followed this approach instead of more carefully specifying the nature of nursing practice, finding ways to quantify it in valid and reliable ways, and predicting its effect. When talking about nursing services, we need to frame them in the context of their organizational system. This approach requires environmental indicators. We do not always take complexity into account when trying to represent what actually happens in practice. Often what gets captured in the notes does not reflect the complexity of planning, communicating, and co-ordinating care for patients. In describing nursing care services we must be clear that nursing care constitutes a process and a series of actions over time, as well as a series of responses over time. Thus, a host of questions arise: is nursing a series of

tasks represented by the number of procedures; is it the amount of direct care time or hours per patient day; is it a set of discrete interventions, which may or may not capture the complexity of care; or is it a protocol that is itself an intervention? Do only nurses perform it, or can it be delegated to another team member? Is it a shared interdisciplinary effort? Is it attributable to a single nurse or to shared accountability? Is it characterized by intensity and, if so, does that mean how much, and is it quantifiable? Is it characterized as having a focus or a direction? Is it affected by the organizational system in which it is conducted and, if so, in what way?

Recently, Naylor, Bowles, and Brooten (2000) provided an example of quantifying nursing practice. They used the OMAHA classification system to examine the problem domains and intervention categories for geriatric patients. The problem domains were environmental, psycho-social, physiological, and health-related behaviours. The intervention categories were health teaching, dietary counselling, treatments and procedures, case management, and surveillance, which included critical analysis and monitoring. According to the study's findings, the primary problem area for every patient was physiological; the next areas, in descending order, were health-related behaviours, psycho-social, and environmental. The mean number of interventions was 164 for each patient's case, which included 8 contacts, 3 visits, and 5 telephone contacts. Surveillance/monitoring accounted for 66% of the interventions, teaching, guidance, and counselling for 20%, case management for 14%, and procedures for 1%.

In another study (Grobe et al., 1997), we were interested in determining the feasibility of describing nursing care processes by using two patterns of nursing care variables: intensity and focus. Intensity was defined as the frequency of interventions and focus as the intervention categories used most frequently. We had a sample of 22 breast and 33 prostate cancer patients who had recently had surgery for an initial cancer diagnosis and were followed up post-discharge for 4 weeks. Over 4 weeks, each patient received 8 contacts (3 home visits, and 5 telephone contacts) from advanced practice nurses (APNs). The APNs were asked to record their interventions, and then a research assistant manually abstracted the intervention data from the health record. The only restriction for the APN's documentation was that the description of an intervention needed a verb and a noun. A previously developed taxonomy was used to classify the interventions. Interventions that lacked 100% agreement were reviewed by three coders. All interventions were used to determine both intensity and focus across the two types of patient care. Intensity by contact differed by type of cancer; breast patients had 1,230 interventions, and prostate patients had 1,600 interventions. Prostate patients had a mean of 48.76 interventions across 8 contacts, whereas breast patients had a mean of 55.86 interventions. Intervention intensity differed by type of contact, with 60-64% of interventions

completed in the 3 home visits, and the remaining interventions accomplished during the telephone contacts. Prostate patients received more interventions classified as teaching ($p < .01$). Breast cancer patients received more assessment and monitoring ($p < .01$) of their status and more case management ($p < .01$), such as referrals. Both types of patients were equal in terms of interventions classified as procedures and encouragement in self-care interventions. Self-care interventions increased over time when comparisons were made between the first and the last contact. Teaching was the predominate intervention for both the first and last contact for both types of patients. Providing emotional support increased substantially from the first contact to the last for both types of patients. When combined, the monitoring and assessing interventions were reduced by half from the first to last contact for breast patients ($p < .001$) and for prostate patients ($p < .01$). Case management interventions increased from the first to the last contact for all patients. This study supports the conclusion that it is possible to characterize nursing care using both intensity and focus. This approach seems to provide quantifiable data to define, describe, and compare care when assessing outcomes of care.

Conclusion

The context of the health care system and the organization of care must be considered as we try to capture the characteristics of nursing care. Data validity, reliability, and quality are essential. For nursing services, we need to capture data that reflect organizational characteristics and care attributes of focus, intensity, and complexity. With respect to language, we are currently working toward understanding concept-level terminologies to determine if the ways we represent nursing are acceptable for the information models proposed in the international standards work.

Implications of Multi-Level Modeling for Nursing Systems Outcomes Research

The conceptual issues in multi-level modeling in organizations are complex. Hierarchical arrangements of individuals are nested in work groups, which are further nested in larger organizations. There are two different approaches used in this type of research. The first is a micro-perspective that assumes that individual variation arises due to differences in individuals, irrespective of the larger context in which individuals operate. The second, or macro-perspective, assumes that given a particular set of situational constraints, individuals will behave similarly.

The macro-perspective focuses on an aggregate of collective responses and deals with global measures or data aggregates. If conclusions are generalized to lower levels, misspecification may result. The fewer groups that you have, the stronger the correlations will be. It is difficult to draw policy implications from findings. The micro-perspective is rooted in psychological origins, and data are collected at the individual level. If generalizations are made to a higher (i. e., aggregate level), misspecification is a possibility. An ecological fallacy is committed when erroneous conclusions are drawn about individuals based on analysis of group data. Questions arise about where data should be collected. If data are collected about staffing or outcomes at the hospital level, and conclusions are drawn about relationships that exist at the unit level, the risk is of committing an ecological fallacy. Alternatively, if data are collected at the individual level to draw conclusions about groups, for example, nurses' work at the unit level, and then the research tries to reach further conclusions about nurses' work at the hospital level, the conclusion may be subject to aggregation bias, which is an erroneous conclusion drawn about groups based on analysis of individual data.

In multi-level work, it is extremely important to have a theoretical perspective on the three possible types of constructs used: global, shared unit, or configural unit.

- Global unit constructs are single level phenomena. They originate and are manifest at the unit level. They do not originate in individuals' perceptions, and there is no possibility of within unit variation. They have objective and observable properties, for example, hospital size measured as the number of open usable beds. Subjective perception is not relevant at this level. Therefore, it is sufficient to ask single informants for the information, provided that they have access to the information.

- A shared unit construct describes characteristics that are common to a unit, but originate in individuals' perceptions, experiences, etc. Because consensual processes

operate, variation is possible. Information should be assessed at the individual level and evaluated for "sharedness." Staff morale is an example of a shared unit construct; although there may be variation, there is an element of "sharedness."

- Configural unit constructs capture an array of individuals' characteristics on a unit. Like shared unit constructs, they originate at the individual level and are measured at the individual level. But unlike shared unit constructs, these are not consensual and do not need to be evaluated for "sharedness." An example of a configural unit construct would be the average level of education on a nursing unit.

Multi-level modeling is used when the theory suggests the influence of one level on a different level, either as a direct effect or a moderating effect on data across levels (Heck & Thomas, 2000; Hox, 1995; Klein & Kozlowski, 2000). Multi-level modeling should not be used when the central phenomena of interest are uninfluenced by higher level units.

Hierarchical data violate the assumption of independent observations in OLS Regression; therefore, standard errors are underestimated and, because of this, there is the possibility of finding significant statistical effects where none exist. Traditionally, these types of situations were handled through aggregation, where the data at the individual level are combined into a score for the higher level, thereby reducing variability, or through disaggregation, where the higher level score is assigned to all of the individuals in that unit. This approach ignores the fact that individuals within a group tend to be more similar than individuals across groups and that this similarity (measured with an Interclass correlation coefficient) can substantially confound the analysis. Multi-level modeling takes into account the clustered nature of the data. It avoids having to use either aggregation or disaggregation strategies. It is able to consider both levels simultaneously.

Steps in Multi-Level Modeling

1. Develop the lower level "regression" model. This is the model that addresses predictors of relevant dependent variables in the Level 1 groups.
2. Add relevant "contextual" predictors from the Level 2 group that are thought to affect the Level 1 outcomes.

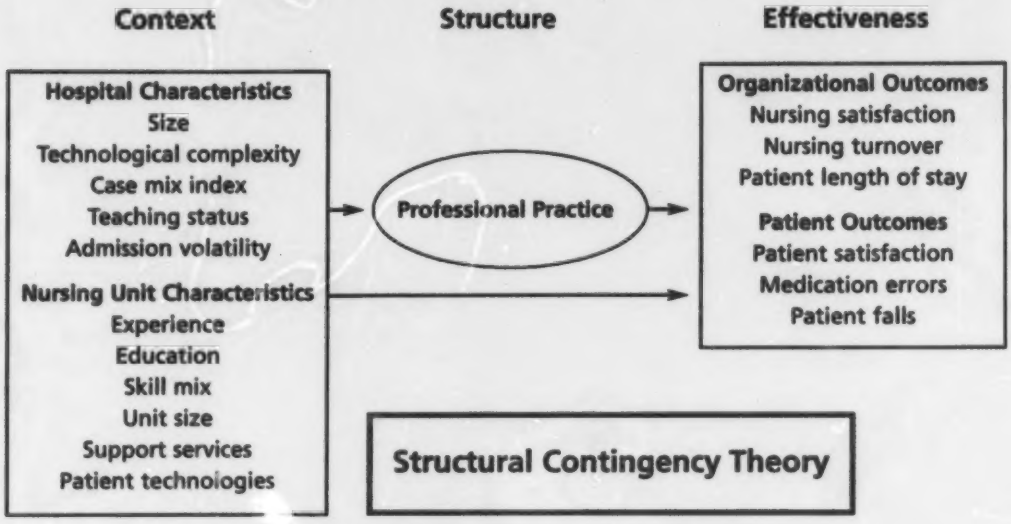
The following is an example of steps in multi-level modeling:

Level 1 model: Staff nurse performance is a function of his/her tenure and decision-making capability.

Level 2 model: Unit size and patient acuity influence the relationships among performance, tenure, and decision making.

In preliminary analysis of data from our recent study, the Outcomes Research in Nursing Administration Project (ORNA), we tested a theoretical model of the impact of professional practice on selected organizational and patient outcomes (See Figure 2).

Figure 2. Model for ORNA Study



The research design was a longitudinal, non-experimental, casual modeling study (6-month interval). The nursing unit was the unit of analysis.

We obtained a random sample of participants from11 south eastern U. S. states from JCAHO-accredited (Joint Commission on Accreditation of Healthcare Organizations), non-federal, not for profit, non-psychiatric, short-term general hospitals. Initially, 67 hospitals and 129 units were represented. Of these, 60 hospitals and 120 units participated in the study.

The sources of data included the following:

- Study co-ordinators captured the following information: size, teaching status, hospital life cycle, high technology services, and Case Mix Index (CMI).
- Nurse managers provided information on financial data, staff mix, education, turnover, falls, and medication errors.
- Staff nurses provided information on patient complexity, decentralization, satisfaction, autonomy, RN/MD relationships, and support services.
- Patients provided information about satisfaction.

The analytic plan we adopted was Multi-level Covariance Analysis (MCA) with Mplus software. MCA takes into account the violation of independent observation and integrates structural linear equation modeling latent variables with hierarchical linear modeling.

In order to illustrate different findings based on different analytic strategies, we first analyzed the data using MCA. Then we re-analyzed the data using traditional structural equation modeling with AMOS software. The key similarities between traditional modeling and MCA in our findings included the following:

- The predictors of professional practice were similar;
- Professional practice was consistently associated with higher levels of nursing satisfaction; and
- There was similarity in limited effects on outcomes of professional practice.

The key differences between traditional modeling and MCA in our findings included the following:

- Most differences occurred in relationships between contextual variables and outcomes;
- Experience and LOS related (-) in the traditional model, but not in MCA;
- Patient technology related (+) to LOS in the traditional model, but not in MCA; and
- Unit size, falls, and medication errors related in MCA, but not in the traditional model.

The study's implications are that theoretical development is needed to more clearly identify the existence of multi-level processes that affect outcomes of care. Also, different policy implications arise from different analytical strategies.

Continuity Across Sectors

An integrated health care system has a mandate to increase quality while reducing cost throughout the whole system. We are accountable to payers and clients to demonstrate value in terms of the processes and interventions that we provide. In order to do so, we have to be able to capture the health care team's contributions across the entire continuum of care.

Anderson and Helms (1998) defined continuum of care and identified multiple issues in this area. They focused on conceptual issues that affect the ability to conduct research about the continuum of care. The relevant patient factors are functional status, psycho-social issues, and patient/family preferences. Relevant professional factors include, for instance, the skill and knowledge base necessary to assess and create an appropriate plan of care, as well as the communication, team work, and critical thinking involved in moving the plan of care forward. It takes time to record data, and we must allow for resources to collect data, as well as systems to enable assessment.

Methodological issues arise in measuring continuity. Continuity of care is a construct rather than a concept. It is difficult to conduct research on the construct, so we often find that researchers examine the continuity from an individual's perspective. Donabedian's (1980) model examines the relationship between structure, process, and outcome. The research done by the Outcomes Taskforce of the Kaiser Permanente Medical Care Program Northern California Region (KPNRC) used Holzemer, Bakken Henry, Stewart, & Janson-Bjerklie(1993) model. Underlying this model is the fact that the client, provider, and setting each bring their own structure, process, and outcome to the equation. Therefore, to examine a concept, one must consider all these areas. In the continuum of care, there are multi-levels that must be considered so that we can understand what is the best health care we can provide at the best cost.

To understand care across the continuum, we need an electronic infrastructure that captures processes of care and patient variables from all settings. We also need the language and terminology to describe these processes and variables. In large databases, this can become an issue when there are many users who may interpret the word(s) differently. Both reference and interface terminology are necessary. Reference terminology defines what a single concept means. Interface terminology reflects the fact that we have multiple words that mean the same thing. When we first started to examine the data quality of the nursing administrative databases in the KPNCR, it took sustained efforts to reach the point where we could use the data to describe the care we provide our patients. In one test of validity, data were provided to clinicians, and they were asked to state whether they believed that these data matched their practice. In

medical centres where we had great confidence in the data, clinicians said that, in fact, the data did reflect their care. This process stimulated agencies to improve data quality.

In order to reduce costs when budget restrictions occurred across the U. S., nursing was driven to make changes in nursing practice without understanding the impact on patient outcomes. The nursing executives on the KPNCR needed to develop an event-driven outcomes infrastructure to support research-based practice. The Outcomes Taskforce (OTF) was created to develop an outcomes infrastructure that would include patient problems, interventions, and outcomes and to provide the base to understand the relationships between these elements. We also wanted the technological and data infrastructure to support quality improvement. The goal was quality patient care as defined by the Institute of Medicine: the degree to which health services provided to individuals and populations increase the likelihood of the desired health outcomes and are consistent with current professional knowledge. For the OTF, outcomes are not structure or process variables; they are not assessment, care plans, or critical pathways; they are not care maps; they are not patient goals; and they are not a patient's health status at a single point in time. Outcomes are changes in health status between two or more points in time, where health status encompasses physiological, functional, cognitive, emotional, and behavioural health. Outcomes can be positive, negative, or neutral and are intrinsic to the patient. Outcomes can be related to the care provided or to the natural progression of disease or disability, or they can be related to both.

Functional status was an important component of the outcomes infrastructure because independence is crucial to quality of life. In home care, functional status can be seen as a proxy for an agency's performance. Knowledge is important to patient well-being and is viewed as foundational to patients' ability to monitor, contribute to, and be involved in their health care. Knowledge and engagement in care have to be considered together because of this relationship. The first test of the resulting Health Status Outcome Dimensions (HSOD)(Lush, Henry, Foote, & Jones, 1997) instrument was to examine its content validity and its sensitivity to change over time. In one of the studies, functional status, knowledge and engagement in care, and psycho-social well-being were measured in the congestive heart failure (CHF) and total joint replacement populations. In both populations, psycho-social well-being, knowledge, and engagement improved between the first measuring point on admission and the end measuring point of the study, about 6 weeks later. The functional status outcomes were very different for the two groups. For the total joint replacement group, functional status was high on admission, low on hospital discharge, but was improved to preadmission status at 6 weeks. CHF patients came in with a lower functional status. On discharge their functional status improved, but 6 weeks later, it had decreased again to preadmission scores. What model of care would help the total joint patients achieve

maximal functional status in the shortest time? What model of care could we introduce to change this negative slope seen in the CHF patients? For example, would a weekly telephone follow up help the CHF patients and prevent/reduce re-admissions?

The OTF needed to understand whether nurses would use the information that was collected using the HSOD to plan care. In a study of two medical centres within 30 miles of each other that had similar administrative data, a similar model of care, the same hours of care, and the same staff mix, etc., we found that nurses did use the data from the assessment to plan the care. An interesting finding in this study was that the variable that explained the greatest variance in the results was facility. The percentage of patients where psycho-social issues were identified on the plan of care was 55% at one agency and 26% at the other. Knowledge also varied between these two agencies. When we discussed this fact with the nurses on the local research committee, they identified culture as the reason for the difference. In one of the cultures represented, psycho-social issues are considered private and not a priority area of focus. There were different outcomes for the 2 sites. The site that planned interventions to meet psycho-social needs had fewer re-admissions, post-discharge provider visits, and emergency room visits.

In the next research phase in the development of the HSOD, we refined the language to achieve greater inter-rater reliability. We also clarified the question on symptoms to make it more generic, so that nurses could use it for pain and other symptoms, depending on why the patient was being assessed. In addition, we developed a patient version of the HSOD. It was important to capture the patient status across the continuum and over time. In areas like the medical office setting, we would need the patients to collect data. We were planning to test the new instrument when a new model of care was introduced. Our evaluation of the HSOD instrument has been put on hold for now. In the meantime, we are learning to look at data and think in terms of processes and their impact on patient outcomes. We need to present data in different ways so that these data can help leadership to prioritize performance improvement activities. Control charts are used to examine the stability of processes of over time, and analysis of means is used to identify best practices. We are learning to deal with the issue of statistical significance versus clinical and operational significance. We need to know what to respond to, and when and how to respond. We are also trying to look at how to deal with different measures for the same concepts that are used in the varied continuum of care settings.

In developing databases to examine outcomes, it is extremely important to involve front line clinicians. They need to receive feedback about the data in a timely fashion. If they do not understand how data will be used, the data quality may be affected. Educating staff about why they are collecting data is important. Funding for education must be built into the project. In health care, it is essential that we have systems in place to support examining changes in patient health status over time.

Discussion

There is a large investment in time and cost for everything that we measure; therefore, we should consider what we can measure. We need to have a conceptual/theoretical model before determining an analytic strategy that would identify relevant inputs, processes, and outcomes. We tend to want to look at the whole picture, but this may not always be possible.

Are we missing the boat by looking only at inputs and outcomes, but not processes? We need to be pragmatic. It may be that, initially, we can collect inputs and outcomes. Then, as the electronic systems develop, we may be able to capture interventions. The science of outcomes is evolving. We may be able to conduct some small studies in which we manually abstract nursing interventions for research on outcomes. In the meantime, we can work to improve the quality of the data. As we move forward in categorizing data, we may find clusters of specific interventions that can explain most of the outcomes. Through the categorization work, we may be able to explain some key types of interventions that we could begin to collect data on, which would be useful in an explanatory manner. Unless we do this, we cannot explain practice variations and, therefore, change practice. Some conditions are sentinel conditions; there may be care maps or some proxy, for example, functional status, that could be considered as sentinel processes.

For The Nursing and Health Outcomes Project we need to begin to work with organizations around the change that is coming and what it will mean for all nurses in Ontario. Nurses will need to know that this project will involve completing standardized assessments on all patients that are admitted to facilities. We also need to make them aware that completing these assessments will provide them with data for quality improvement. The data will be gathered at the unit level.

The question was asked if the Kaiser Permanente Organization were to begin this process again, were there variables that they would leave out; were there variables that did not have explanatory power; did they have problems collecting the data; did they feel that it was not worth collecting the data? Also, what indicators on the outcomes side do they wish they had collected data on? They responded that they added a cost variable (length of stay) to the outcome measures; however, they found that length of stay may be less dependent on management decision making than on external pressures such as managed care or DRG payment. They added the following outcomes to their data collection: skin breakdown, symptom distress, nosocomial infections and urinary tract infections. They encountered measurement difficulties with some variables, for example, teaching status.

Data and Technology

Architecture of Information Systems

Michael Guerriere, MD, MBA

Linking Nursing Data in Ontario

Jack V. Tu, MD, MSc, PhD, FRCPC

Donna Thomson, RN, PhD Student

Building on Existing Data: Considerations for Future Development

Christine Fitzgerald, MSHA, CHE

Michael Guerriere, MD, MBA

Dr. Guerriere is a seasoned executive in hospital management and health information systems. After studying undergraduate computer science, he obtained his Doctor of Medicine degree from the University of Toronto and subsequently completed clinical training in Internal Medicine. In 1996, he completed an MBA from the Kellogg Graduate School of Management at Northwestern University in Chicago.

Dr. Guerriere is the Chairman and CEO of HealthLink Clinical Data Network Inc. HealthLink provides network-based products and services to forty-two health care organizations across Ontario. Prior to moving to HealthLink, Dr. Guerriere was a senior executive in a variety of teaching hospitals, most recently as the Executive Vice President and Chief Operating Officer of The University Health Network (Toronto General, Toronto Western and Princess Margaret Hospitals). Dr. Guerriere sits as a Director on the boards of a number of organizations including CIHI, ICES, Ryerson Polytechnic University, Medisolution Ltd. and Toronto Medical Laboratories

Dr. Guerriere is an Assistant Professor in the Department of Health Administration at University of Toronto and an Adjunct Associate Professor at the University of Victoria School of Health Information Sciences. In April 1998, Dr. Guerriere received the Financial Post Top 40 Under 40 award which recognizes 40 outstanding individuals in Canada under the age of 40.

Jack V. Tu MD, MSc, PhD, FRCPC

Dr. Jack Tu joined ICES as a Scientist in 1996. In addition to his position at ICES, his other appointments are: Associate Professor with the Department of Medicine at the University of Toronto, and Staff Physician in the Division of General Internal Medicine at Sunnybrook & Women's College Health Sciences Centre. His cross-appointments also include: Scientist in the Clinical Epidemiology Unit at Sunnybrook, as well as Associate Professor in the Department of Public Health Sciences and Health Administration at the University of Toronto.

Dr. Tu serves on numerous health care committees and supervises students completing their master or doctorate theses. He has lectured to research associates and at conferences in Canada, the United States and Europe. In 1998, he was granted a Medical Research Council of Canada Scholar award which extends to 2003. Dr. Tu earned a Doctor of Medicine from the University of Western Ontario, a Master of Science degree in Clinical Epidemiology from the University of Toronto, and a PhD in Health Policy from Harvard University.

Donna Thomson, RN, PhD Student

Donna is a Registered Nurse and a graduate of McMaster University's Masters in Business Administration program. She is currently a nursing administration Ph.D. student at the University of Toronto, working with Dr. Linda Lee O'Brien-Pallas. She holds a Medical Research Council (now Canadian Institute for Health Research) doctoral student grant to explore a methodology to measure nursing performance. Donna is involved in a number of projects that use one or more secondary databases in conjunction with primary data. Current research projects are focused on the relationship between organizational characteristics, including nurse staffing and workload, with both patient and nurse outcomes.

Donna was the Ontario MIS coordinator during the implementation of the national MIS guidelines. The primary focus of this phase was collection and reporting of workload data for all professional groups. Donna has presented MIS education sessions nationally for CIHI, in Ontario for the Joint Policy and Planning Committee (JPPC) and the Ministry of Health, and in New Brunswick for the Department of Health and Wellness. She also conducts the MIS certificate program for the Ontario Hospital Association (OHA). She has participated in the development of comparative reports and in the development of costing and funding formulas using workload data.

Prior to her involvement with the MIS Guidelines, Donna held several nursing management positions in a tertiary acute care facility, including critical care, inpatient nursing, and emergency, as well as fulfilling several co-ordinator roles including the implementation of a workload measurement system.

Christine Fitzgerald, MSHA, CHE

Christine Fitzgerald is currently a private consultant specializing in health informatics. Christine has extensive experience in the development, implementation and evaluation of standards relating to health information. She has led large, complex projects relating to the development of new health information systems, or the re-engineering of existing systems. Examples of projects included the development of a new Canadian Classification for Health Interventions (CCI), the enhancement of ICD-10 (ICD-10-CA) for use in Canada, the re-engineering of Canada's national hospital discharge abstract database, the development of a new national registry for hip and knee replacements, and the development of a new National Ambulatory Care Reporting System for hospital-based ambulatory care services.

Prior to becoming a private consultant, Christine was Director of Product Management with the Canadian Institute for Health Information where she was responsible for all activities related to the Institute's data holdings – data holdings

included the National Health Expenditures database, the Annual Hospital Survey, the Hospital Morbidity/Discharge Abstract Database, the Therapeutic Abortions database, the National Trauma Registry, the Ontario Trauma Registry, the Mental Health Database, the Ontario Chronic Care Database, the Canadian Organ Replacement Register, the National Physician Database, the Southam Physician Database, the Canadian Registered Nurses Database, and the Allied Health Personnel Database. Prior to working at the Canadian Institute for Health Information, Christine was Vice-President of The MIS Group, a founding member of the Canadian Institute for Health Information, which was responsible for the development of the MIS Guidelines – the national standards for financial and operational data relating to Canadian health service organizations.

Christine has been a member of numerous provincial and national committees related to health information and chaired Canada's National ICD-10/CCI Implementation Committee, the National ICD-10 Enhancement Task Force, the National Hospital Morbidity Advisory Committee and the National MIS Strategic Advisory Committee. Christine has also been an advisor to the Conference of Deputy Ministers of Health's Advisory Committee on Health Human Resources and has represented Canada at international meetings related to WHO's ICD-10 and ICIDH classifications.

Christine has a Masters in Health Services Administration from Dalhousie University and a Bachelor's of Science from Acadia University. She is certified member of the College of Health Service Executives, a member of the Canadian Health Organization for the Advancement of Computers in Health, and a member of the Canadian Health Economics Research Association.

Architecture of Information Systems

In this discussion, I will focus on some of the changes that are happening in computer systems and architectures. I will also mention some technologies that may have an impact on collecting information to analyze outcomes in health care.

The status of information systems in health care is inadequate. Despite perceptions to the contrary, Canadian and U. S. information systems in health care are at similar stages in their evolution. Although the U. S. spends more on information technology (IT), most of their funding is devoted to claims management. If you take that amount out of consideration, the spending on health IT is similar in the two countries. Canadian spending on IT focuses on clinical data. The last few years have been a struggle for health informatics companies as they have been unable to make a profit on health care information systems; consequently, most information systems in Canadian health care organizations have old architectures. A frustrating area is the lack of standards and compatibility between systems; however, new architectures are changing this situation.

To date the Internet has not had a strong impact on information technology in health care; however, the Internet will give us the ability to move data around without worrying about standards issues and how data is structured. This will offer us the ability to link health records wherever they reside, as well as the ability to surf through records. The issue of standards and compatibility will be solved by using web-based technology to integrate clinical information at the desktop level. This development has important implications for new technologies.

An infrared technology is being used for tracking patients. Patients wear a band, and they can be tracked throughout the system. This allows administrators and others to examine patient flow. It has been suggested that this process could be used for staff tracking(and workload measurement), but there are concerns with this big-brother style approach. This type of technology exists and may, or may not, be useful in the future.

Seven Points about Measuring Nursing Interventions and the Impact on Outcomes

1. Any collection exercise has to be simple. Collection processes need to be designed iteratively, so that they can be added onto later. It is hard to do specifications when we have not used something before. Keeping something extremely simple at the start, but maintaining flexibility for future growth, is important.

2. Work on standards should be focused on data dictionaries and data definitions, not on system compatibility. Web-based technologies will solve the compatibility issue in the near future.

3. We first need to define the reports and questions to be answered before we design the whole process or system for collecting clinical indicators. While this sounds fundamentally like the obvious approach, people have at times set up elaborate systems and elaborate databases without any idea of what they want from them. Then, when they ultimately decide which questions they want answered, the systems are unable to answer them.

4. Nursing should explore ways to combine skills from the profession of nursing with those from technical professions such as engineering and computer science. In architecting systems, a background in two disciplines is helpful. The technical architecture skills assist in designing efficient work processes.

5. Combine functions in terms of how people interact with information systems. An excellent documentation system should allow us to abstract indicators on interventions and outcomes without requiring duplicate data entry. Currently we have separate systems for collecting workload information and for documenting patient care. This results in additional work for clinical professionals in short supply.

6. We need to think about paying for data. Governments should consider paying per abstract, paying for information, and paying for results. There must be a strong incentive for people to report the data, continue reporting the data, and conform to standards. An example would be workload data that hospitals are required to submit to the government. Hospitals submit this data but its quality is poor. Financial incentives would improve the quality of the information we have available to manage the system.

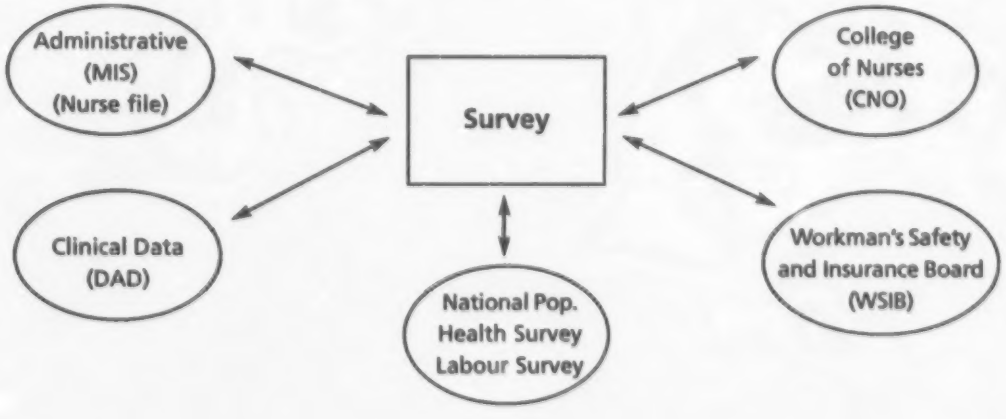
7. Think about systems that learn the individual user's preferences. For example, if you set up a home page on the Internet, your preferences are tracked. In clinical documentation, systems using new technologies can learn. For example, if a user types a free text line, the system could record that and subsequently make it available in a drop down box that allows you to choose that option with a mouse click. Even though there is a free text field, the system could allow each user to develop a few commonly used choices and to reduce the time for clinical documentation. The system learns from each individual user's previous responses.

All of these seven considerations could usher in an era of excellent indicators that would allow a much more proactive approach to optimizing the care we provide to patients. Once we understand the relationship between nursing interventions and patient outcomes, determining the most cost-effective allocation of resources in the patient's interest becomes a less anecdotal exercise.

Linking Nursing Data in Ontario

I have been working with hospital characteristics, nurse staffing, and patient outcomes data as part of several funded research projects. Linda Aiken's international study at the University of Pennsylvania is funded by the National Research Institute in the U. S. This study focuses on linking nursing inputs to patient outcomes. In Ontario, Drs. Judith Shamian, Geoff Anderson, and Jack Tu were the prime investigators for the international study on outcomes. In conjunction with Drs. Micky Kerr and Heather Laschinger, we had the opportunity to add additional questions about the health of nurses and their level of organizational trust to the core RN survey questions. This survey was used to collect individual nurse responses to key questions about their organization. These responses were aggregated to create variables that described hospital level characteristics. I am also involved in another project, funded by the Workman's Safety and Insurance Board (WSIB). The principle investigators on this project are Drs. Linda Lee O'Brien-Pallas and Judith Shamian. The databases that we are linking for this project are shown below (see Figure 3). The National Population Health Survey and Labour Survey data were not directly accessed, but we attempted to compare our research findings to the data reported in these databases.

Figure 3. Databases for WSIB Study in Ontario



The following issues arise around linking databases:

Hospitals are defined differently in different databases:

- The number of hospitals and the hospital names do not match. This is largely due to the numerous changes in hospitals, such as mergers, closures, and alliances, that have occurred during the restructuring period. Self-report data about hospitals do not always match the Ministry of Health and Long-Term Care (MOHLTC) identification based on the most recent legal name and status.
- There have also been some longstanding differences in how hospitals are categorized across the different databases. For example, the College of Nurses of Ontario (CNO) identifies the employer by the term *general hospital*, while Management Information Systems (MIS) collects data by categories such as community, teaching, and small hospital. These may all be included as general in the CNO data.
- The databases do not include the same hospitals. The MIS database does not include information about provincial psychiatric hospitals or private hospitals. For example, the number of nurses reporting psychiatry as their speciality does not match the number of psychiatry nursing hours in the MIS database.
- The databases historically have been assigned different numerical identifiers.

Nurses are defined differently in different databases:

- In the CNO registration, nurses are classified as individuals, while in MIS there is no data about the number of individuals, only about nursing unit earned/paid hours in two categories – hands-on care providers and management and support.
- The number of nursing hours for nurses not working in a nursing unit cannot be identified in the MIS database. In the WSIB database, the claims information does not identify the individual by profession but by employment category, such as nursing, and includes all nurses in the organization without identifying their employment unit.
- The MIS data did not initially define the type of nurse provider but grouped all hands-on care as one. The recent addition of staff mix and employment status by RN, RPN, and unlicensed care provider in a unique nurse file has been a great improvement. However, during the first year of this data collection process, the nursing information was collected during the operating plan process, and it may not necessarily match the actual year data for the same fiscal year.
- Nurse provider data is not collected in the Discharge Abstract Data (DAD).

Nursing units are defined differently in different databases:

- The MIS data defines categories such as med/surg, obstetrics, psychiatry, rehabilitation, or chronic regardless of whether the care is provided in a general hospital or a free standing non-acute facility. The CNO data has an entirely different set of categories.
- It is difficult to compare the number of nurses that work in rehabilitation or chronic hospitals in the CNO database to the MIS database where this activity is identified in both acute and free-standing facilities.
- Hospitals are not required to report management or education staff by discipline in the MIS data.
- Nursing units are not identified in the WSIB database or the DAD.

Reporting periods are defined differently in different databases:

- Some data are collected for the fiscal year, while others are gathered for the calendar year.

Data availability varies for each database:

- For the survey for the international study, data were collected in 1998; WSIB data were not available till the end of the 1998 calendar year, and DAD and MIS data for fiscal year 1998/1999 were not available until early 2000.

Data quality varies for each database:

- There are manuals that describe the collection process and data definitions for some, but not all, of the databases.
- The quality checks that take place between the receipt of data and its distribution to researchers are not available for most databases other than the published edit checks conducted by the MOHLTC for the MIS data.

The following is an example of the various ways in which a nurse can be defined and illustrates the problems that may occur while linking databases:

- All individuals providing nursing care,
- Direct care providers only,
- RNs only,
- FTEs/Individuals,
- FT/PT, or
- Paid hours/worked and benefit hours.

Databases have been developed for single purposes. The point was made yesterday that we need to use data for multiple purposes. We should be able to use information about nurses in hospitals not just for funding, but also for issues about supply and demand and health outcomes. The concept of single purpose administrative databases is old. We have never had the technical ability to link major databases in the past, and we have not had the foresight to see that we might need to link databases in the future; therefore, we need common identifiers, data definitions, and units of collection. Linkage of data is essential if we are to understand the health care system and how operational decisions affect both patient and nurse outcomes. The many different organizations currently collecting data about nurses urgently need to come to a common understanding of our information needs and to agree on the key data elements and definitions, as well as the best process for collecting, reporting, and sharing nursing information.

Building on Existing Data: Considerations for Future Development

In determining the feasibility of building on existing databases, we first need to consider the scope of The Nursing and Health Outcomes Project, which is currently focusing on acute care inpatients, public and private long-term care settings, and community care (hom care). At this point, we are excluding the following patient categories: hospital-based ambulatory care, complex continuing care, rehabilitation, and paediatrics. We have also made the assumption that *International Classification of Diseases and Related Problems*- version 10 (ICD-10-CA) will be implemented in Ontario.

To facilitate the systematic assessment of variables contained in existing databases, I used the Irvine, Sidani, McGillis Hall Nursing Role Effectiveness Model (Irvine, Sidani, & McGillis Hall, 1998) to develop an assessment framework. (See Figure 4).

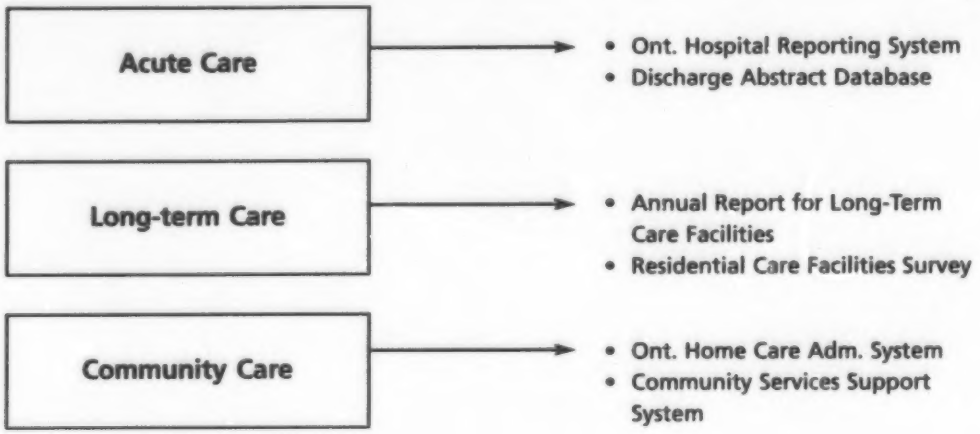
Figure 4. Assessment Framework

(Based Irvine Sidani McGillis Hall Nursing Role Effectiveness Model)

Components	Inpatient Acute Care	Long-Term Care	Community Care
Structure Nurse Patient Organization			
Process Dependent Independent Interdependent			
Outcomes Safety Symptom Control Self Care Functional Status Patient Satisfaction Efficiency			

Using this model, we can begin to understand the variables that we want to collect and for which sector. As part of the assessment, I identified approximately 25 national and provincial databases or surveys; however, only a few of these data sources are relevant to The Nursing and Health Outcomes Project (See Figure 5).

Figure 5. Relevant databases


Acute Care
• Ont. Hospital Reporting System
• Discharge Abstract Database
Long-term Care
• Annual Report for Long-Term Care Facilities
• Residential Care Facilities Survey
Community Care
• Ont. Home Care Adm. System
• Community Services Support System

In addition to the assessment of databases, it is also important to review any relevant standards that relate to these databases. For example, when the Ontario Hospital Reporting System is reviewed, the definitions and structures contained in the Management Information System (MIS) Guidelines need to be considered; for the Discharge Abstract Database (DAD), classification standards for health interventions and diagnosis need to be reviewed for applicability and relevance.

Obviously, the first priority is to determine if data pertaining to registered nurses can be retrieved from these databases. For the Ontario Hospital Reporting System, we are able to retrieve data pertaining to registered nurses and non-registered nurses. The reporting period for this data, however, is only once per year. In this database, we are also able to segregate nursing data pertaining to inpatient services from nursing data pertaining to ambulatory care. And finally, we are also able to retrieve data pertaining to characteristics of the facility.

The DAD can be linked with the Ontario Hospital Reporting System data via the facility identifier. For the DAD, data are sent to the Canadian Institute for Health Information (CIHI), where the data go through a number of data quality edits. Error reports are sent back to facilities for review and correction if necessary. The data are then grouped using the complexity CMG methodology, and resource intensity weights are assigned to the CMGs. In Canada, unlike the U. S., we type diagnoses so we can

F2

differentiate between pre-existing conditions and complications acquired after hospitalization; therefore, CMGs are adjusted for the complexity of cases based on different combinations of co-morbid conditions. An age adjustment also is made. The resource intensity weights (RIW) that are assigned to the CMGs are based on actual cost data, not charge data. You can disaggregate the weights and actually determine a nursing weight because you have actual cost data for nursing-specific hospital services.

If the DAD is being considered to collect some of the necessary variables pertaining to The Nursing and Health Outcomes Project, a number of factors must be examined: Are the necessary data recorded on the patient's chart? If the data are not on the chart, they cannot be abstracted by health records.

- What is the burden of data collection on health record departments whose resources are already stretched?
- Is there space on the abstract for additional variables? Currently, about 90 elements can be abstracted from DAD, depending on the number of diagnoses/interventions that are captured. There is limited room on the abstract for additional variables. The following basic variables are currently captured: institutional chart number, health care number, address, gender/weight, birth date, data on admission/separation/transfer, physician/non-physician provider information, diagnosis, both the most responsible diagnosis and co-morbid conditions, and other diagnoses. There is also room for collecting health interventions.
- What is the cost of making changes to software programs? Any changes to the abstract requires that changes be made to abstracting software, which result in costs for hospitals.

The DAD data are transmitted monthly to CIHI.

The outcomes of interest that have been identified to date by The Nursing and Health Outcomes Project include the following:

Functional status

Self-care

Symptom management (dyspnea, nausea, fatigue, pain)

Patient satisfaction with nursing care

Nurses' job satisfaction

Adverse occurrences (falls, medication errors, decubitus ulcers, nosocomial infections)

Since the relevant adverse occurrences and symptoms are health conditions contained in ICD-10-CA, the DAD offers the opportunity to collect these variables as part of existing data collection processes. It is important to remember that the DAD data are discharge-based; however, for a number of the conditions, for example pain, collection is required on admission and discharge. For pain, ICD-10-CA allows us to code the following related to pain: pain not classified elsewhere, classified acute pain, chronic intractable pain, other chronic pain, and unspecified pain. In discussions about pain as an outcome of nursing care, we said that frequency and intensity must be considered. In this regard, additional variables would need to be collected in order to have an appropriate measure of pain. In the area of decubitus ulcers (DU), more opportunities exist to capture the information we require. ICD-10-CA has codes for the following: DU limited to erythema only, without skin breakdown, DU limited to breakdown of skin (Stage 2), DU with fat layer exposed (Stage 3), DU with depth involving muscle (Stage 4), DU with depth involving bone (Stage 5), DU with necrosis involving muscle bone, and DU without mention of severity.

The DAD may provide some of the data we need for the acute care sector. However, it is important to remember that the structural variables pertaining to registered nurses is collected and reported at the functional centre level, whereas the diagnosis data are captured at the patient level and reported at the institutional level. If we are interested in looking at the relationship between nursing and patient outcomes, then we need to determine what is the appropriate unit of analysis.

In the long-term care sector, little relevant data are available. Although there is annual reporting, much of the data are used for reconciliation purposes by the Ministry of Health and Long-Term Care. Currently you cannot retrieve data on registered nurses from the Annual Report for Long-Term Care. On the other hand, the Residential Care Facilities, which is a survey done by Statistics Canada, segregates registered nurses data. There are a number of data quality issues related to this survey. Finally, with regard to home care, you cannot retrieve data on registered nurses from existing relevant databases but at least there is the capacity to make relatively minor changes to enable the capture of these data. Again, as with existing data sources for the long-term care sector, there are issues with data quality with the existing databases pertaining to the community care sector.

In conclusion, a number of questions must be addressed as we move forward on collecting outcome data for The Nursing and Health Outcomes Project:

What is the unit of analysis (patient, functional centre, facility, region)?

What are the required structural variables (nurse, patient, organization)?

What is the level of collection for organizational variables?

What is the time of data collection; for example, in short length of stays what role does nursing play in health outcomes?

What is the frequency of data collection?

When, how, and by whom is a unique nurse identifier assigned?

Other factors also need to be considered as we move forward. For example, we may need coding guidelines to ensure that the necessary variables are accurately recorded and abstracted. Second, we need to ensure that privacy and confidentiality issues are effectively addressed, not only in terms of data linkages, but also in terms of collecting data on client assessments. Third, we must incorporate a data quality framework as part of the overall project vision. Fourth, as we move forward, we need to remember the software vendors, so that they have time to properly incorporate the necessary specifications in their software. And finally, to minimize the burden of data collection on data suppliers, we may need to consider implementing an abbreviated version of the MIS guidelines in the long-term care and home care sectors.

Recommendations for Capturing Nursing Indicators and Health Outcomes in Ontario

DOROTHY PRINGLE, RN, PhD

Dorothy Pringle, RN, PhD

Dorothy Pringle completed her BScN at McMaster University, her MS degree in psychiatric/mental health nursing at the University of Colorado and her PhD in nursing from the University of Illinois. She has been a staff nurse and aftercare supervisor in psychiatric settings, the mental health nursing coordinator at the Holy Cross Hospital in Calgary and research director for the national office of the Victorian Order of Nurses.

Her academic career has included faculty positions at McMaster University, Laurentian University in Sudbury, Ontario, where she was director of the school of nursing, and at the University of Toronto where she was dean from 1988-1999. She has taught psychiatric nursing, nursing administration, and care of individuals in long term care settings in undergraduate programs and courses on nursing in longterm care and designing longterm care settings in graduate programs. She has received an outstanding teacher award from the Ontario Association of University Teachers and the Jeanne Mance Award for outstanding contributions to the profession of nursing from the Canadian Nurses' Association.

Her research has focused mainly on older people with cognitive impairment and the support and assistance needed by their family caregivers. She is particularly interested in the role of respite on the well-being of caregivers and the nature and role of interpersonal relationships with nurses in the quality of life of cognitively impaired elders. Her funding has come from the Ontario Ministry of Health, NHRDP, and the Alzheimer Society of Canada. She has published and spoken very broadly on the topic of aging, health services for older people and nursing research. She has consulted with the federal government, numerous provincial governments and organizations and agencies on the types of services required by the aged.

She has served on and chaired many research peer review committees including the Ontario Ministry of Health, the Medical Research Council of Canada, the National Health Research and Development Program, the Alzheimer Society research program, and the Canadian Nurses Foundation. As well, she has served on the boards of Sunnybrook Health Science Centre, the Toronto Hospital, Queen Elizabeth Hospital, Baycrest Centre for Geriatric Care, the Workplace Safety and Insurance Board and the Institute of Work and Health.

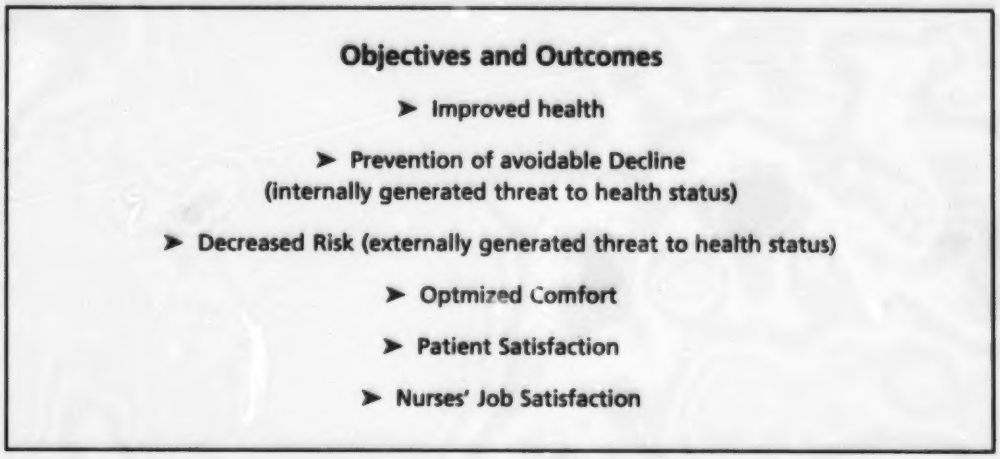
Dr. Pringle is the Project Director for the Nursing and Health Outcomes

Recommendations for Capturing Nursing Indicators and Health Outcomes in Ontario

The report of the 1996 Academy of Nursing Conference influenced our project by providing a solid background in outcomes. We needed to understand if these were the relevant outcomes for our system.

The Nursing and Health Outcomes Project – Expert Panel created a framework to explicate what the health care system in Ontario was trying to achieve. We identified six objectives of this system (see Figure 6).

Figure 6. Health Care System Framework


Objectives and Outcomes
➤ Improved health
➤ Prevention of avoidable Decline
(internally generated threat to health status)
➤ Decreased Risk (externally generated threat to health status)
➤ Optmized Comfort
➤ Patient Satisfaction
➤ Nurses' Job Satisfaction

We then created a matrix to identify what outcomes would be associated with what objectives. Finally, we determined what nursing-sensitive outcomes would be linked to the overall system outcomes. We then went back to the literature to see if the nurse-sensitive outcomes that we identified were reflected in research studies. At this point, we commissioned some work for the critical appraisal of the outcomes. This work was reflected in yesterday's presentation *State of Science: A Methodological Review of the Literature*. The Expert Panel then met to review and make decisions regarding those outcomes. Their key points are summarized as follows:

Functional status is important in all sectors. There was support for a broad definition, which would incorporate ADL and IADL. We are not sure which instrument to use for measurement. A different instrument may be appropriate for each sector.

Self-care: We need more work on conceptualization and measurement for this concept.

Symptom management: Dyspnea, fatigue, nausea, and pain. These symptoms should be measured on a simple 0-10 numeric scale by patients. We have yet to determine how frequently and when in the course of the episode of care this information should be collected and entered onto a database.

Patient satisfaction with nursing care: In Ontario, the Hospital Report Card examines patient satisfaction. Although the nursing community is not happy with the Report Card's current nursing component, work is underway to improve this measure for the acute care sector. These data are collected on an annual basis from a random sample of patients. Currently, the Hospital Report Card does not include long-term care and community care sectors.

Nurses' job satisfaction: We need to collect information about this. We have had discussions with the College of Nurses of Ontario about building some variables into the annual registration process.

Adverse occurrences: (e. g., medication errors, patient falls, nosocomial infections, decubitus ulcers). We are in an era of "patient safety" and we cannot ignore this area. Definitional problems arise with these concepts. It may be that we should not collect information on all of these adverse events, but rather select one or two that are distinctly related to nursing practice. In Ontario, the Registered Nurses of Ontario (RNAO) and the Registered Practical Nurses Association of Ontario (RPNAO) are developing Best Practice Guidelines (BPGs) for patient falls and decubitus ulcers. We may want to collect information of these outcomes as work is being done in this area. Participants were asked if we are proposing capturing too many outcomes?

Symptom management should be at the heart of nursing, and therefore we need to include this outcome. Functional status is a measure by which so much is referenced. Functional status is important in the acute care setting even with the current focus on shorter lengths of stay. It may be difficult to sort out whether the change in functional status is a result of the care delivered or the course of the disease process in the acute care setting. However, nursing does make the difference in functional status in the long-term care setting, and in home care, the role of nursing has more of an impact. Self-care is integral to nursing practice. We need to recognize that there are issues with defining self-care.

In Ontario, satisfaction is measured only once a year. It is costly to complete this survey. It was pointed out that a yearly survey may not be sufficient to be of true value

as an outcome indicator. In Ontario, we are in a quasi-competitive environment where satisfaction does not relate to consumerist behaviour. If we can attach a value to patient satisfaction and show that it may be related to other outcomes, then we may be able to make a case for increased surveys for quality improvement and accountability, but also for specific surveying that will allow us to focus on specific issues.

The patient safety items may be the most problematic, particularly nosocomial infections. The issue of definition is difficult. We need to consider risk adjustment strategies, especially for adverse events. We do need to take into account under/over reporting in organizations. We can capture patient falls with injury in the discharge database; however, this is done at the facility level, not the unit level. Adverse events tend to be sentinel events; consequently, they are rare. Therefore, it is hard to use the information. There are practice settings that support good professional practice, and others that do not. Adverse occurrences happen in both good and bad hospitals, and many of the factors that influence these occurrences are system issues. Nurses are not responsible for them. There are, however, issues with organizational culture and organizational competence. This finding supports the idea that the organization may be the unit of analysis. Rather than a linear relationship, a constellation of issues must be considered in adverse events. Moreover, we need to consider the continuum of care for these events. For adverse occurrences, we may want information at the organizational rather than the unit level, as it is organizational issues that have an impact on these outcomes. For the ANA project, researchers examined nosocomial infections, but were unable to link them with nursing input. Medication errors relate to many things within the system, and there is a need to explore this area further. Just because nurses give the medication, they are not necessarily responsible for the error.

How hospitals are labelled in databases must be examined. We need to manage the disconnects between the nurse and the patient. We need information at the nurse/patient level as well as at the unit level. How do we identify the unit that the patient is on? Patients are assigned to the unit/functional centre where they spend most of their inpatient days.

It was suggested that we may not need to worry about the "unit." In the hospital, one does not need to link the individual nurse to individual patient outcomes. This area may not be one that we should worry about at this point. What we are doing is not a research project.

The data collection for these outcomes initially may consist of a manual process whereby we ask nurses to collect data and then enter them into a database. Although the Internet may move this area forward, we are not sure how soon an impact will be felt at the unit level. For long-term care, data collection will be a manual process in some facilities and an electronic one in others. Home care will be able to accommodate

electronic data collection in 4 years. For the acute care sector, some hospitals will be electronic in 2 years; however, for others it may take longer. We may want to work with an organization that is starting to operationalize an electronic design and work with them to incorporate some of these elements. If we have a model that works, then we can replicate it.

We will have to deal with cultural issues so that organizations and individuals will buy into this standardized approach. Getting buy in for this project and getting people to value the data are important. Funds must be directed towards this initiative. Also, working towards standardization is a process. People or organizations may have to give up some of their own assessment needs.

There are three drivers of cost: (a) the cost of collecting data, (b) the cost of turning data into information to distribute to the public for accountability and to the profession for quality improvement, and (c) the cost of changing behaviour. The cost initially may seem huge, but we need to compare it against the savings that will come from having this type of information available.

The federal government and Statistics Canada are funding a measure of health status for large population samples across the country to look at the system and how it works. It consists of a self-report, and the samples are large enough so that interview data can be linked with health care data. This will allow them to link data about individuals to the health care services that they receive. The Nursing and Health Outcomes Project may want to connect with this group. Most of health care is not about change in health status, but about maintaining a certain level. The critical thing about responsiveness is that it can detect significant change in a person who is relatively stable.

Nurse job satisfaction is an important outcome; however, we should consider who will use the data, who will collect it, who will pay for it, who owns it, and who is expected to make the improvements. While nurses are the biggest employee group in the hospital, they are not the only professional group. It may be that nursing is a proxy for the other professions. It was suggested that there may be nursing variables that we can put into the MIS under functional centre which would take just a few minutes to input, but which would provide some rich data about the unit.

Staff mix data are important to collect. We need to gather information about education and experience at the unit level. If we could manage the unique identifier number, we could get these data from the College of Nurses database. A cost is associated with adding data to the College of Nurses annual registration from. It was noted that while information about post-academic education is important, we also need to find out about the specific training/certification programs that nurses take. This is not currently captured on the College of Nurses annual registration form. On the

annual registration form nurses state the type of area they work in rather than indicating a specific organization. This limits our ability to link nurses to organizations. We may want to provide a list of hospitals from which nurses can choose.

Most participants believed that it is important to somehow capture the culture of the unit. In addition, autonomy, team co-ordination and communication, and physician-nurse relationships were considered important. We also need to consider collecting information about the size of the unit, as this has been shown to influence outcomes.

References

Agho, A. (1993). The moderating effects of dispositional affectivity on relationships between job characteristics and nurses' job satisfaction. *The Australian Journal of Advanced Nursing*, 10 (4), 10-19.

Aiken, L. H., Smith, H. L., & Lake, E. T. (1994). Lower medicare mortality among a set of hospitals known for good nursing care. *Medical Care*, 32, 171-187.

American Nurses Association. (1995). *Nursing report card for acute care*. Washington, DC: American Nurses Publishing.

American Nurses Association. (1996). *Nursing quality indicators*. Washington, DC: American Nurses Publishing.

American Nurses Association. (1997). *Implementing nursing's report card*. Washington, DC: American Nurses Publishing.

American Nurses Association. (2000). *Nursing quality indicators beyond acute care: Literature review*. Washington, DC: American Nurses Publishing.

Anderson, M. A., & Helms, L. B. (1998). Comparison of continuing care communication. *Image: Journal of Nursing Scholarship*, 30, 255-260.

Atkins, P. M., Marshall, B. S., & Javagli, R. G. (1996). *Happy employees lead to loyal patients*. Journal of Health Care Marketing, 16(4), 15-23.

Bernabei, R., Gambassi, G., Lapane, K., Landi, F., Gatsonis, C., Dunlop, R., Lipsitz, L., Steel, K., & Mor, V. (1998). Management of pain in elderly cancer patients. *Journal of the American Medical Association*, 279, 1917-1922.

Blegen, M. A. (1993). Nurses' job satisfaction: A meta-analysis of related variables. *Nursing Research*, 42, 36-41.

Blegen, M. A., & Mueller, C. W. (1987). Nurses' job satisfaction: A longitudinal analysis. *Research in Nursing and Health*, 10, 227-237.

Burns, R. B., Moskowitz, M. A., Ash, A., Kane, R. L., Finch, M. D., & Bak, S. M. (1992). Self-report versus medical record functional status. *Medical Care*, 30 (Suppl.), MS85- MS95.

Cavanagh, S. J. (1992). Job satisfaction of nursing staff working in hospitals. *Journal of Advanced Nursing*, 17, 704-711.

Cleeland, C. (1989). Measurement of pain by subjective report. In C. Chapman & J. Loeser (Eds.), *Issues in pain management* (pp. 391-403). New York: Raven Press.

Coenen, A., Marin, H. F., Park, H. A., & Bakken, S. B. (2001). Collaborative efforts for representing nursing concepts in computer-based systems: International perspectives. *Journal of the American Medical Informatics Association*, 8, 202-211.

Donabedian, A. (1980). *Exploration in quality assessment and monitoring: The definition of quality and approaches to its assessment.* Ann Arbor, MI: Health Administration Press.

Eriksen, L. R. (1995). Patient satisfaction with nursing care. *Journal of Nursing Measurement*, 3(1), 59-76.

Fawcett, J., Tulman, L., & Myers, S. T. (1988). Development of the inventory of functional status after childbirth. *Journal of Nurse-Midwifery*, 33, 252-260.

Fries, J. F., Spitz, P. W., & Young, D. Y. (1982). The dimensions of health outcomes: The Health Assessment Questionnaire, disability and pain scales. *Journal of Rheumatology*, 9, 789-793.

Good nursing, good health: An investment for the 21st Century. (1999). Toronto, Canada: Queen's Printer for Ontario. Retrieved March 14, 2001, from the World Wide Web; http:www.gov.on.ca/health

Grobe, S. J., Hughes, L. C., Robinson, L., Adler, D. C., Nuamah, I., & McCorkle, R. (1997). Nursing intervention intensity and focus: Indicators of process outcomes studies. In U. Gerdin et al. (Eds.), *Nursing informatics: The impact of nursing knowledge on health care informatics. Proceedings of N'97, Sixth Triennial International Congress of IMIA-NI, Vol. 46* (pp. 8-14). Amsterdam: IOS Press.

Heck, R., & Thomas, S. (2000). *An introduction to multi-level modeling techniques.* NJ: Erlbaum, Lawrence Associates.

Hinshaw, A. S., & Atwood, J. R. (1983). Nursing staff turnover, stress, and satisfaction: Models, measures, and management. *Annual Review of Nursing Research, 1*, 133-153.

Holzemer, W. L., Bakken Henry, S., Stewart, A., & Janson-Bjerklie, S. (1993). The HIV quality audit marker (HIV-QAM): An outcome measure for hospitalized AIDS patients. *Quality of Life Research*, 2, 99-107.

Hox, J. (1995). *Applied multi-level analysis.* Amsterdam: TT-Publikaties. Retrieved March 14, 2001, from the World Wide Web; www.fss.uu.nl/mj/jh

Institute of Medicine. (1999). *To err is human: Building a safer health system.* Washington, DC: National Academy Press.

Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: National Academy Press.

Ironson, G. H., Smith, P. C., Brannick, M. T., Gibson, W. H., & Paul, K. B. (1989). Construction of a Job in General Scale: A comparison of global, composite, and specific measures. *Journal of Applied Psychology, 74*, 193-200.

Irvine, D., & Evans, M. G. (1995). Job satisfaction turnover among nurses: Integrating research findings across studies. *Nursing Research, 44*, 246-252.

Irvine, D., Sidani, S., & McGillis Hall, L. (1998). Finding value in nursing care: A framework for quality improvement and clinical evaluation. *Nursing Economic$, 16*, 110-116.

Irvine Doran, D., Sidani, S., McGillis Hall, L., Watt Watson, J., Mallette, C., Laschinger, H., Pringle, D., & White, P. (2001). *The state of science: A methodological review of the literature on nursing-sensitive outcomes.* Unpublished report.

Johnson, M., & Maas, M. (1998). The nursing outcomes classification. *Journal of Nursing Quality, 12* (5), 9-20.

Kaldenberg, D. O. (1999). Patient satisfaction and the role of choice. *Marketing Health Services, 19* (3), 39-42.

Katz, S., & Akpom, C. A. (1976). Index of ADL. *Medical Care, 14*, 116-118.

Keith, R. A., Granger, C., Hamilton, B. B., & Sherwin, F. S. (1987). The Functional Independence Measure: A new tool for rehabilitation. *Advances in Clinical Rehabilitation, 1*, 6-18.

Klein, K., & Kozlowski, S. (2000). *Multi-level theory, research and methods in organizations.* San Francisco: Jossey-Bass.

Knight, M. M. (2000). Cognitive ability and functional status. *Journal of Advanced Nursing, 31*, 1459-1468.

LaMonica, E. L., Oberst, M. T., Madea, A., & Wolfe, E. (1986). Development of a patient satisfaction scale. *Research in Nursing and Health, 9*, 43-50.

Leiter, M. P., Harvie, P., & Frizzel, C. (1998). The correspondence of patient satisfaction and nurse burnout. *Social Science and Medicine, 47*, 1611-1617.

Lush, M. T., Henry, S. B., Foote, K., & Jones, D. L. (1997). Developing a generic health status measure for use in a computer-based outcomes infrastructure. In U. Gerdin, M. Tallberg, & P. Wainwright (Eds.), *Nursing Informatics* (pp. 229-234). Amsterdam: IOS Press.

Lyons, T. F. (1971). Role clarity, need for clarity, satisfaction, tension, and withdrawal. *Organizational Behaviour and Human Performance, 6(1)*, 99-110.

Malhoney, F. I., Wood, O. H., & Barthel, D. W. (1958). Rehabilitation of chronically ill patients: The influence of complications on the final goal. *Southern Medical Journal, 51*, 605-609.

McCorkle, R., & Young, K. (1978). Development of a symptom distress scale. *Cancer Nursing, 5*, 373-375.

Melzack, R. (1975). The McGill Pain Questionnaire: Major properties and scoring methods. *Pain, 1*, 277-299.

Melzack, R., & Wall, P. (1965). Pain mechanisms: A new theory. *Science, 150*, 971-979.

Meterko, M., Nelson, E. C., Rubin, H. R., Batalden, P., Berwick, D. M., Hays, R. D., & Ware, J. E. (1990). Patients' judgement of hospital quality: A report on a pilot study. *Medical Care, 28* (Suppl.), S1-S56.

Mitchell, P. H., Ferketich, S., & Jennings, B. M. (1998). Quality health outcomes model. Image: *Journal of Nursing Scholarship, 30(1)*, 43-46.

Mitchell, P. H., Heindrich, J., Moritz, P., & Hinshaw, A. S. (1997). Outcome measures and care delivery systems. *Medical Care, 35 (Suppl.)*, NS19-NS32.

Mueller, C. W., & McCloskey, J. C. (1990). Nurses' job satisfaction: A proposed measure. *Nursing Research, 39*, 113-117.

Nahm, H. (1940). Job satisfaction in nursing. *The American Journal of Nursing, 40*, 1389-1392.

Naylor, M. D., Bowles, K. H., & Brooten, D. (2000). Advanced practice nurse interventions during transitional care. *Public Health Nursing, 17*, 94-192.

Price, J. L., & Mueller, C.W. (1981). *Professional turnover: The case of nurses.* New York: SP Medical and Scientific Books.

Rubenstein, L. Z., Schairer, C., Wieland, G. D., & Kane, R. (1984). Systematic biases in functional status assessment of elderly adults: Effects of different data sources. *Journal of Gerontology, 39*, 686-691.

Shaughnessy, P. W., Crisler, K. S., & Schlenker, R. E. (1998). Outcomes-based quality improvement in home health care: The OASIS indicators. *Quality Management Health Care, Fall*, 58-67.

Shortell, S. M., Rouseau, D. M., Gilles, R. R., Devers, K. J., & Simons, T. L. (1991). Organizational assessment in Intensive Care Units (ICUs): Construct development, reliability, and validity of the ICU nurse-physician questionnaire. *Medical Care, 29,* 709-723.

Sidani, S., & Irvine, D. (1999). *Evaluation of the care delivery model and staff mix redesign initiative: The collaborative care study.* Unpublished report.

Sindhu, F. (1996). Are non-pharmacological nursing interventions for the management of pain effective?: A meta-analysis. *Journal of Advanced Nursing, 24,* 1152-1159.

Smith, P. C., Balzer, W. K., Ironson, G. H., Paul, K. B., Hayes, B., Moore-Hischl, S., & Parra, L. F. (1992). Development and validation of the stress in general (SIG) scale. Paper presented at the meeting of the Society for Industrial and Organizational Psychology, Montreal, Canada.

Smith, P. C., Kendall, L. M., & Hulin, C. L. (1969). *The measurement of satisfaction in work and retirement: A strategy for the study of attitudes.* Chicago: Rand McNally.

Stamps, P. L., & Piedmonte, E. B. (1986). *Nurses and work satisfaction: An index for measurement.* Ann Arbor, MI: Health Administration Press Perspectives.

Ware, J. E. (1993). *SF-36 Health Survey: Manual and interpretation guide.* Boston: Nimrod.

Ware, J. E., Snyder, M. R., Wright, R., & Davies, A. R. (1983). Defining and measuring patient satisfaction with medical care. *Evaluation and Program Planning, 6,* 247.

Weisman, C. S., & Nathanson, C. A. (1985). Professional satisfaction and client outcomes: A comparative organizational analysis. *Medical Care, 23,* 1179-1192.

Young, G. J., Charns, M. P., Daley, J., Forbes, M. G., Henderson, W., & Khuri, S. (1997). Best practices for managing surgical services: The role of co-ordination. *Health Care Management Review, 22(4),* 72-81.

Youngblutt, J. M., & Casper, G. R. (1993). Single-item indicators in nursing research. *Research in Nursing and Health, 16,* 459-465.

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